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EDITORIAL NOTES—GAS, &c.

The Effects of the New Policy.

WE have waited for it; and it has at length come. And that is a full and fervid appreciation on the part of the proprietors of the Gaslight and Coke Company of the work of the Governor and his colleagues and of their loyal staff in rescuing this big undertaking from the enfeebling conditions that were ramifying it as the result of the imperturbable conservatism of the old Board. The appreciation was set in graceful phrases by Mr. Hounsom, and he said not a word too much. It was fitting the appreciation should have been uttered in a year of specially opposing hardships in management, and in a year, too, in which, despite drawbacks, the accounts have stood forth without compare in the history of the gigantic concern. Mr. Hounsom took the proprietors back five years—contrasting then with now; and he put upon the shoulders of the proprietors the major part of the blame for the position in which things were then. The proprietors were largely to blame, notwithstanding the courteous absolution of the Governor. For criticism and warning alike were very freely made year after year; but among the proprietors the voice of the critic and of the warner was just as effectual as the voice of one crying in the wilderness. They heard, but they heeded not. They were apathetic. They saw the placid exterior presented in public by the Board; they knew nothing of the rumours of an uphill fight, in the safe seclusion of the Board-room, on the part of about the only member of the directorate who could place his fingers on the seats of cankerous growth, and who now—most fortunately for the Company—directs from the headplace their vast affairs. It was the proprietors who perpetuated all too long a mistaken policy (it was nothing more, but its consequences were great, and difficult to contest) by the retention of those who framed it and who perversely pursued it. They ought to require no more proof than the present accounts to show them that the critics were right; their own past indifference wrong. They have shown they do not require more than the present accounts to assure them that the new policy—a policy that has had to deal with a great diversity of affairs, and has had to take into account a thousand-and-one little things that had been neglected in the past—has been the cause of what is characterized as the "remarkable advance," and the "steady, quiet, and per-"sistent progress," that have been marked in the recent past. For this (we say it deliberately) a debt of gratitude is due to the Governor. In a large undertaking of this kind, a strong leader counts for much. The Company wanted a leader. One was at hand; and to him his colleagues and the officials have responded with right good will and revived enthusiasm. Works, staff, men, and departments have been reorganized; and there is an intention that the ground reclaimed is not going to be lost again, not even temporarily.

The Governor's speech brought home to those who were heedful of details that much has happened since the closing of the accounts that were before the proprietors at their previous meeting. The higher priced coal and oil have borne heavily upon the working of the past six months (having added to the annual manufacturing costs a quarter-of-a-million sterling). Meter-rents have been reimposed, bringing in an additional revenue of about £60,000 a year; but above all the price of gas has unexpectedly been reduced by 1d., returning to the consumers £80,000 a year. Consider the conditions, and the administrative achievements assume their proper proportions, and indicate the responsiveness to progressive and sentient ordering of a previously latent vitality. The whole of the good points affecting the half-year's doings were, as usual, marshalled and presented by the Governor with modesty; and it was the crowning point when he announced to the proprietors that an increase in dividend was prospectively near. That is something for which the proprietors have waited long. It has been a humdrum sort of investment for them that has trundled on year after year receiving only £4 8s. per cent. dividend per annum, and invariably with a market price standing below par. Such an investment was not attractive; and when the Directors recently announced the reduction in the price of gas, the hope was expressed in these columns (it was a hope that there were good grounds for believing would be realized) that the ordinary proprietors would receive the encouragement of, and their investments be raised in value by, an addition to their dividend, at the earliest possible moment. The Governor announces—and he is in a position to do this without violating the pledge of the Board that the re-establishment of the meter-rents should affect the standard price in relation to the operation of the sliding-scale as though it were 1d. lower—that "from the 1st of "January, due to the reduction in the price of gas, the "shareholders are entitled to an increased dividend; and it "is the intention of the Directors to recommend it in due "course." The business of the current six months has opened well; and it is anticipated, having regard to the financial conditions, the economies of improvement which are permanent in their effect, and the signs as to lower coal prices, that it will not be long before the proprietors will have the further evidence of the fruitfulness of the new policy when prosecuted by ability.

Among the points in the Governor's speech was a reference to the indications of lower prices for coal. There is no doubt there is a turn in the tide of trade. For January there was a decrease compared with January, 1907, of upwards of 4 millions sterling in our imports; a decline of nearly £700,000 on our exports; and a decline a good distance above 2 millions sterling on re-exports. These are signs of the times; and the coal owners cannot maintain their inordinate prices in the face of such trade declension as this. The statement of the Governor regarding the relation of capital to business is also of peculiar interest. To be able to point to an increase of business to the extent of 2½ per cent. last year, with a capital expenditure increased by only one-fifth of 1 per cent., is exceedingly gratifying; and no less so is the declaration that the requirements of dividend and interest are at the present time at a figure which for lowness constitutes a record in the history of the Company. Linked to this question of capital expenditure is another interesting statement, which indicates the change that has, almost imperceptibly to those outside the management of the Company, come over the gas-manufacturing system for the North of London. Mainly in the cause of economy, several of the Company's manufacturing stations have been closed down; and Beckton during the winter has been the producing source of as much as 60 per cent. of the total supply required. But this does not mean that the trend is to a final concentration at Beckton. The Nine Elms and Fulham works are to undergo development on modern lines, and their importance as tributaries of supply will in future rank much higher than hitherto. There is interest, likewise, in the excellent report the Governor was able to make as to the appreciation and enthusiasm of the Company's men in the efforts put forward for their technical and useful advancement; and the establishment of workshops (which, of course, will be under the direction of practical men) for the training of boys who desire to become efficient in the craft of gas-fitting is an innovation that will be followed with the greatest sympathy and interest. The Company's policy comprehends the future as well as the present; and it is desired that there shall be in the future in the service of the Company none but men whose skill is a reality and not a sham.

Movements in the Interests of the Gas Industry.

BRITISHERS are accused of being a phlegmatic race; and verily sometimes our actions give support to the accusation. There was one thing that struck the Home Secretary just recently when a deputation of coal owners went before him, and painted in drab colours the evils that would befall if the Government passed their Bill for the restriction of the hours of work of the coal miner. In no wise did they over-colour the evils; but Mr. Gladstone, in promising the deputation (as was the only courteous thing that he could do) that their representations should be duly considered, expressed his astonishment that he had not heard what the users of coal had to say on the subject. As coal users comprehend the whole community, and coal owners and miners only a comparatively, though powerful, section, there was certainly good ground for the Home Secretary's surprise. But the fact of the matter is we are too prone to curb our interests to our own immediate concerns, and give too little heed to those external influences that may work to the good or ill of those concerns. However, reminded of the fact that users were evincing a sublime indifference to a scheme that threatened a permanent raising of the level of coal prices, of course all the great users were at once awakened to the necessity of doing something; and arrangements for deputations to the Home Secretary are now being pushed forward in all quarters of industry. But the domestic coal users—aggregating a greater force than the coal miners—have no organization through whom representation can be made. Something should be done in their behalf. However, it is Sir George Livesey whom we have to thank for having taken the initiative in a movement for ensuring that the views of the great coal-consuming gas industry are brought before Mr. Gladstone. The gas industry uses good class coals, and fairly expensive coals, and to an amount (according to the Board of Trade returns for 1905-6), in the case of the statutory company and local authority gas undertakings alone, of about 14½ million tons. Anything that will permanently increase the cost of that immense quantity of coal will inflict an injury on the gas consumers the country through; and the same applies in the case of all other manufactured commodities. The injury will be cumulative, in that it will attack the coal consumer through all his purchases. If the Government were specially devising legislation for tempting a greater dumping-down of foreign manufactured goods in this country, they could not go a better way to work.

There appears to be some question in the minds of certain of the speakers at the meeting of the Gas Companies' Protection Association last Thursday (at which a somewhat involved resolution was passed which it is to be hoped will eventuate in a deputation on the subject of the Bill being received by Mr. Gladstone) as to how the restriction of the hours of miners would affect the cost of coal. It seemed to be thought that the shortening of hours would result in shortage of production. We do not believe there would be any such shortage; but that the effect would be a heavier cost in getting the coal, through the spreading of a greater amount of labour over a given output. It is impossible to go on indiscriminately increasing labour to do a specified amount of work without at the same time increasing the cost. And, furthermore, the vacillation in the demand—of course, we are assuming just for the moment that the coal owners would not take any counteractive measures—would necessitate, on the reduction of the hours of skilled labour, a greater dependence on casual and less skilled labour to make up any deficiency in the production of the skilled hands. Casual labour is always, in the result, more expensive than permanent and skilled; its employment tends to reduce the average output per man; and its employment, too, inures to the increase of the risks and liabilities of the owners. It is, therefore, not difficult to see the source of the increase of cost.

As has been proved again and again, there is not the slightest necessity for the proposed legislation. The miners have ever shown themselves powerful enough to get much of their own way, and to work when they like. There is nothing of the weakling about the coal miner. But it seems to be a feature of the work of the present Government to so legislate that those who have to pay most as a result of that legislation shall be the least of the beneficiaries, or not among them at all. It is also open to question in this case whether the Government are not by their scheme doing a grievous injury to the miners themselves. It is the view of the Socialist-Labour party that the reduction of the hours of skilled labour is the best means of providing for the absorption of the unemployed. There is something radically wrong with their philosophy. No solution of the unemployed problem is to be found in such an uneconomic proceeding as is now in contemplation. But what it may lead to is the greater displacement of skilled labour by the extended employment of coal-cutting machinery. The last returns have shown us that America is in the front in the amount of coal output per man; and the secret of this is nothing more nor less than coal-cutting machinery. Electric power is being provided extensively in the coal regions of this country; and there is now every inducement to the enlarged adoption of mechanical operation. The Government Bill will provide further stimulation if it becomes law. The Gas Companies' Protection Association have decided on doing their part in opposing the Bill; and we hope the Committee will go before the Home Secretary with the full knowledge that they have at their backs a united gas industry. This is not a political matter; it is the national welfare that is at stake.

There were two other important matters brought before the Association at this extraordinary meeting. They were comprised in resolutions passed at the last annual meeting of the members, and had reference to the rating of gas undertakings and to the standardization of the "Metropolitan" No. 2 test-burner. The resolution as to rating was originally passed at the instance of Sir George Livesey (seconded and supported by Mr. Corbet Woodall and Mr. H. E. Jones); and its intention was to give the Committee of the Association power to set the ball rolling to secure the institution of rational principles in the rating of gas-works property in view of their peculiar circumstances. At that time the gas-works rating question was in a chaotic position; but the Ipswich decision in the High Court, which has established the contention of gas companies that slot meters, stoves, and fittings should be included in tenant's capital as are ordinary meters, has so altered the position of matters that active measures are no longer exigent. Consequently, the Association have decided to drop action in the matter at present; but we would suggest that the Committee should closely watch the Bill to be introduced by the Government to amend the system of valuation of property in England and Wales for the assessment of imperial and local charges, and see that the interests of gas undertakings are not—if there are means of prevention available—adversely affected by it.

Concerning the question of the standardization of the "Metropolitan" No. 2 burner, and its application generally to the country's gas undertakings, members see difficulties about it. Of course there are difficulties; but it is no use letting difficulties intervene between what is generally admitted to be an excellent thing for the gas industry and a serious attempt to realize that excellent thing. At the same time, it will be well to get acquainted with all the possible difficulties, and be prepared with answers when these difficulties are advanced (as they are bound to be), either by the Board of Trade or by opponents to the proposed standardization. There is no doubt, for example, as to there being a money value in a test-burner that will develop a higher illuminating value from a gas than has hitherto been possible. But adopting such a burner is doing nothing more than following out the spirit of the old Acts, which recognized, as a fundamental principle in gas testing, the justice of giving gas credit for its highest illuminating capability. There is also the question of an implied contract between consumers and suppliers under the testing provisions of existing Acts. But there are certain things that must not be lost sight of by those who profess to act in this matter in accordance with the pulsations of superlative honesty. Since the implied contract was effected, the conditions of use have undergone entire change, and no allowance for this has been made in any Act, excepting in those that have incorporated lower illuminating power standards and the new test-burner. Again, in a great number of cases, there is a provision in Acts which distinctly points to Parliament having no express intention of making the testing instruments a definite and irrevocable part of the contract. The usual testing clause defines the burner, and then adds "or such other burner as the Board of Trade may approve." Furthermore, on this point as to the monetary value of the new burner to the supplier, it has also a monetary value to the consumer; and the sliding-scale provision ensures, in the case of most Companies, that his share is duly handed over to him before the supplier directly reaps any tangible benefit. The Board of Trade are fully aware of this provision; and we do not think that, under the circumstances,

they are likely to be swayed by the excessively refined feelings of a few impeccables. The greatest difficulty we can see in the Gas Companies' Protection Association moving in this matter of standardizing and making generally applicable the "Metropolitan" No. 2 burner is one to which we have previously called attention; and it is that the Association are not representative of the whole industry. Neither is the Institution of Gas Engineers. The technical officials of the gas industry are not the gas industry; and though it would be well to obtain the added strength of their co-operation, there is something else that would be much more effective, and that is a properly prepared petition to the Board of Trade from statutory gas undertakings—both local authority and company. There is no insuperable difficulty, and no great amount of time would be lost, in getting this petition prepared, by sectionizing the country. We cannot conceive of anything that would be more useful than this in securing the sympathy and support of the Board of Trade, or that would give the Association the very authority which they at present lack. We hope sincerely that success will be the result of the work they have taken in hand; and this success will be more assured by the hearty co-operation of all in the industry to whom "Progress" means more than the mere growth of the balance at the foot of the general revenue account prepared for the shareholders of their individual undertakings.

In the Camp of the Illuminating Engineer.

THE dispositions of the wolf and the lamb are not cast in such similar mould that we ever expect to see them dwelling together in amity; nor can we discover any ground for entertaining the belief that, with their diverse interests, the gas illuminating engineer and the electrical illuminating engineer—no matter which represents the wolf and which the lamb—will ever dwell together in peace in any Society formed to supply them with common ground of debate with the object of bestowing some fancied advantage upon the public. In his long and energetic campaign for the establishment of an Illuminating Engineering Society in this country, Mr. Leon Gaster has had as an exemplar the Illuminating Engineering Society of America. But the article published in our issue of Jan. 28, under the title of "The Position of Gas Lighting in the United States," indicated that there has been a decided stepping from neutral ground to the disparagement of the gas industry on the part of the organ of that Society—the "Illuminating Engineer." And the "*amende honorable*" with which the incidents referred to wound up looks much like a compulsory payment of damages for injury inflicted. No Society of the kind can be of permanent value unless neutrality is strictly observed; and if there is any country where "illuminating "engineers" can live and work amicably together that country surely is America, seeing that so many of the gas and electricity enterprises are under the same direction, and worked by the same executive officials. But even where there is so largely this community of interests, partisanship shows its jealous head; and if in America how much more so here, where the keenest of trading rivalry sets up a face-to-face opposition. Better by far will it be for the two industries to work separately for their own distinct and individual ends.

They may, of course, be relied on to do the best for themselves; and, with competition pressing on all sides, what is best for the individual industries will indubitably be best for the public generally. Where one gains an advantage over the other, the "other" may well be left to see that the advantage does not long remain unchallenged. There is one respect in which electricity has never yet been able, for all general purposes, to fairly dispute the supremacy of gas lighting; and that is in cheapness. It is a new phase of an interesting question to learn from the "Illuminating "Engineer" of America that to brand a commodity as being cheap is to "queer" it in the eyes of the ordinary American. Here, when it is remembered that commercialism is the breath of life to the average American, we are confronted with a metaphysical problem too deep to probe. We will not discuss the other reasonings of the "Illuminating Engi- "neer" that led to the original conclusion that gas lighting is going to the wall in America through the public favour shown to electricity—a favour that we are left to assume is ungovernable even by the excelling points of gas, as set forth in what is tantamount to a recantation of the unjustified attack on the American gas industry.

The Reserved Price under the Auction Clauses.

IN preparing, during the past few weeks, the sketch of the principal provisions of the Gas Bills that have been introduced this session, we have been interested in seeing whether or not in any cases the timely suggestions made by Mr. H. D. Ellis in our "Correspondence" columns last November have—either through his letter or through the examples of immediate past sessions—been acted upon by promoters. But the result is somewhat disappointing. The subject Mr. Ellis called attention to was the limitation in the model auction clauses that the reserved price put upon issues of shares or stock shall not be less than the nominal value. The restriction has been very irksome in several cases where capital has been urgently required, and the market price has been below par. Yet ultimately, after being compelled to spend much money on what they have known would be vain effort, the directors of the companies concerned have, through the devious course imposed by the model clauses, arrived at the state when they are allowed the freedom of disposing of the shares or stock "at such price" as they may deem fit.

The enactment in question is really one of those legislative peculiarities arising from a lofty—if sometimes mistaken and unreasonable—desire to protect. But in giving protection, the Legislature should see that it does not overreach itself, so that limiting enactment does not bring in its train consequences which those who have to bear them perchance can least afford. It is an anomaly that the Parliamentary Standing Order treating of this matter of issuing stock or shares does not run parallel with the model clause. That Order has existed since 1877; and it says nothing about stock and shares being issued at not less than the nominal value. All that it does suggest is that the shares or stock shall be offered "at the best price" that can be obtained, unless the Committee on the Bill report that such a provision ought not to be required, with the reasons on which their opinion is founded. This is an altogether different matter from the rigid "shall not be less than the nominal "amount thereof" provision of the model clause; and certainly it is preferable.

However, as Mr. Ellis pointed out in his letter, Parliament has assented on various occasions to the omission of the objectionable provision; thus recognizing there are hardships underlying its imposition that were not originally perceived. We believe the Commercial Company (of which Mr. Ellis is Secretary) were the first to secure the abolition of the restriction in their Act of 1902; and several other Companies—such as the South Suburban and the Tottenham and Edmonton—have followed suit. Last year, for example, of the Gas Companies in Parliament, the Mitcham and Wimbledon and the Worthing Gas Companies in their Acts were granted freedom to use their discretion as to the reserved price; and the New Tredegar Gas and Water Company in their Provisional Order obtained the same liberty. It will be noted that there is an abundance of precedent. This session, in the drafts of the Gosport and Llanelly Bills, the limitation has been excluded, and the same in the Tenterden Gas Order. It is passing strange that so many promoting Companies still voluntarily place themselves under confinement when Parliament is willing to excuse compliance in this particular with the model clauses. We like to see promoters year after year taking full advantage of the liberties that Parliament, in its spasmodic generous moods, is willing to concede.

The Kent County Promotion under Investigation.

A public inquiry into the promotion and failure of the Kent County Gas Company is proceeding before Mr. Registrar Hood, at the London Bankruptcy Court. The further examination of witnesses has been deferred till the 17th inst.; and until the end is reached, a bar is placed to comment so far as this particular promotion is concerned. The Registrar has declined to go into the antecedent promoting exploits of Mr. Henry Warwick Gyde and Mr. Walter Darby; and, with the one exception that he has allowed it to be placed on record that, in the two men whose names have just been mentioned, he has before him a pair of undischarged bankrupts, he declines to depart in any way from the incidents associated with the Kent County promotion. A fairly full report of the proceedings is being published in the "JOURNAL," because it is felt that the more exposure there is of the new system of company promotion that has been dropped, by these

and other adventurers, into the gas industry—purchasing small rubbishy gas undertakings, and landing them on to the public at a big price—the sooner shall we get quit of these operations. The promoters, it is proved, trade for different purposes under different styles—changing their names to suit the occasion and object with chameleon-like ease. Next to the promoters in culpability are those Directors who take part in their several schemes, either for the purpose of easy gain, or because they are persons incapable of appreciating the responsibility they are taking upon themselves. Look at the sorry tale told the other day by Mr. Charles Archer, one of the Directors of the Kent County Company. This appears to have been his first experience at company promoting; he has determined it shall be his last. He did not know at the time of the purchase that the vendors only paid £2350 for the Goudhurst property; he took no steps to ascertain whether it was worth the £21,800 the Directors engaged to pay the promoters for it; he did not even consider it his duty to go and see the property at Goudhurst—in short, he and the other Directors knew absolutely nothing; but their chief functions appeared to be to look after the claims of the vendors, and to think nothing whatever of the defence of those of the shareholders. It is deplorable that the money and interests of the public should be at the mercy of such men. The Companies' Acts have not been strengthened any too soon. The story is worth reading by directors and officials, as it will show them how necessary it is to use all suitable opportunities to advise gas shareholders to beware.

Co-Operation among the Junior Gas Associations.

It is gratifying to find that, as a result of Saturday's conference in Birmingham of representatives of the Junior Gas Associations, several resolutions were carried unanimously—not the least important of which was one to the effect that two representatives from each Association should meet annually to discuss matters of general interest to the members, and another that the next similar gathering should be held in Manchester twelve months hence. This affords distinct proof, not only of a desire among the Associations to co-operate closely with one another, but of a firm conviction on the part of the different representatives that substantial good will result from the meetings. This is also our own view of the matter. But apart from the benefits that may be reasonably expected to accrue to the Associations, these conferences are welcome as a testimony to the enthusiasm which pervades the ranks of the juniors in the profession—enthusiasm which promises well for the industry in which they are engaged. The Associations are necessarily widely scattered; and wherever the meeting place may be, lengthy railway journeys must be undertaken by a majority of the representatives who attend. The Junior Associations are, however, not officered by men who would begrudge time and trouble spent in a good cause, though their readiness to give both deserves none the less on that account the heartiest recognition at the hands of the general body of members of the respective Associations. It is a pleasure to note that, at the invitation of the representatives of the London and Southern Association, a general gathering of the members of the Associations is to take place in London during September, in connection with the Franco-British Exhibition. The visitors may rest assured that their welcome will be no less warm than was that which was extended by their *confrères* to the large party of juniors who spent such an enjoyable day in Manchester during the recent Gas Exhibition. The remaining resolution agreed to—that the meetings of the various Associations should be arranged with the object of obviating unnecessary clashing—is one with which we must also express satisfaction, as a more equal arrangement of the meetings will be a decided advantage from our own special point of view of the reporting of the proceedings.

Methods at Monmouth.

Another chapter has been reached in the dismal tale of the Monmouth municipal electricity undertaking—and one that can make no more pleasant reading for the ratepayers than have those which have preceded it. In fact, the present instalment of the story is what one of the councillors has not inaptly termed "a bitter pill." There appeared in the "JOURNAL" some few months ago reports of the proceedings at a Local Government Board inquiry, which was held to investigate an application by the Town Council for sanction to the borrowing of a further sum of £10,000 on account of the electric light works, to defray liabilities incurred in advance. During the hearing, the Inspector, Mr. H. R. Hooper, felt called upon to criticize severely the methods of the Corporation; and the decision of the Local Government Board with regard to the matter, which is now to hand, fully bears out these strictures. In their communication to the Town Clerk, the Board (as will be seen by reference to our news columns) adopt a most uncompromising attitude. They state that the proceedings of the Town Council in connection with their combined scheme of sewerage and electric lighting have been unsatisfactory throughout; that no proper accounts of expenditure have been kept; and that the Council, in fact, appear to have exercised no control over the expenditure. Further than this, they have allowed the electric lighting undertaking to get into a very bad state indeed, with the result that there are numerous complaints as to the quality of the light, and the number of consumers has not increased during the last three years—"the undertaking has, in fact, involved a heavy loss to the ratepayers, and there is likely to be still greater loss unless the distributing cables are thoroughly overhauled and put into good order at once." A cheerful summing up, indeed, of a present-day example of a municipal incursion into the province of trade! In how serious a light the Board regard the position of affairs is manifest from the fact that they cannot see their way to sanction any further loans, unless the accounts are in future subject to audit by a District Auditor, in place of the existing method, which they declare is of a "most superficial character." The Council, having no alternative, have submitted to this condition; and a Provisional Order is to be applied for accordingly. Monmouth must pay for its experience; but other places possibly—it does not do to be too sanguine—may take warning by the fate that has overtaken ratepayers there. Even in Monmouth, to quote the words of a local paper, "the unenviable criticism to which they are now exposed should have a beneficial effect upon the Corporation as to their future management of public affairs."

Phenols in Gas Liquors.

In another part of the "JOURNAL" will be found the text of a long communication made to the Manchester Section of the Society of Chemical Industry, by Dr. Skirrow, on the determination of phenols in gas liquors, and the distribution of such phenols in the liquors obtained in various parts of the gas-purifying plant. The name of the author will doubtless be remembered by many of our readers, as he was associated with Mr. R. H. Clayton in the production of a paper on "The Estimation of Tar Fog and its Separation from Gases," read before the Manchester District Institution of Gas Engineers at their meeting at Leek last June. Dr. Skirrow first explains the method of carrying out the analyses, and then gives the tabulated results of a number made with liquors from various points of the condensing and washing plant at several works—the phenol being determined in the manner described. The author remarks that the figures are of interest from their bearing on the treatment of the effluent from sulphate of ammonia works, as showing that any attempt to prevent the liquor from taking up phenol by removing the tar from the hot gas would be ineffective; sufficient phenol vapour being present in the gas at the inlet to the primary condensers to account for the phenol dissolved in the condensed liquor from these condensers. At the close of the paper, the author briefly discusses the influence of the phenols on the solution of the naphthalene problem, and refers to the investigations carried out by Mr. Everitt, Dr. Colman, and Messrs. White and Clarry, all of which have been described in the "JOURNAL;" and he expresses the hope that the method he describes, and the results obtained, will be of value to those who are engaged in studying this question.

Scottish Junior Gas Association (Western District).—We learn from Mr. G. Braidwood, the Hon. Secretary, that an ordinary monthly meeting will be held in the West of Scotland Technical College next Saturday, when Mr. A. P. Main, of Falkirk, will read a paper entitled "Gas Heating and Cooking."

Electricity Supply in London.—A return was issued last week, in compliance with an order of the House of Commons dated Aug. 22 last year, of the number of units of electricity delivered, and the average price charged, by Local Authorities and Companies in the Metropolitan Police district, for power and heating and for public and private lighting during their last completed year of account.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 380.)

THE rather optimistic demeanour which the Stock Markets so resolutely maintained the previous week had to give way in the week just closed. But the position had some ups and downs before it finally yielded altogether. The opening on Monday morning was heavy, of course—being depressed by intelligence of the terrible tragedy at Lisbon; but a remarkably quick recovery, led by Consols, was made before the close of the day. Tuesday began in a most cheerful mood. The advance made further progress, and Consols touched 88. Then suddenly a check was sustained; and the last prices were much below the best. Wednesday was variable, and things shaped irregularly; but for the most part the tendency was easier. The falling movement was intensified on Thursday, and all descriptions were lower—actuated to some extent by disappointment at there being no further reduction in the Bank rate. Consols fell $\frac{5}{16}$; Home rails were very flat; Americans were depressed by political agitation and bad trade; and pretty well everything else was down. Friday was a dull day, with free realizing conspicuous, though the air seemed a little clearer before the close. Saturday saw the gilt-edged division standing a little firmer; but the rest hardly changed. In the Money Market, there was a very fair demand all along, and discount rates had a hardening tendency. Business in the Gas Market continued bright and active; and again a goodly number of issues made more or less considerable advances in price, while none pointed the other way. There was a general feeling of gratification that, in spite of the enhanced price of coal and the abnormal mildness of the month of December, the half-year's accounts yet to hand reveal a satisfactory position generally. In Gaslight and Coke issues, the ordinary was active and firm, and the prices marked rose from 99½ on Monday to 100⅝ on Thursday. Little was done in the secured issues; the maximum being dealt in at 88½ to 89½, and the debenture at 83½ and 84. South Metropolitan was quiet and steady, changing hands at from 125½ to 126⅝. The debenture advanced a point, with dealings at from 83½ to 84¼. In Commercials, business was marked in the 4 per cent. at 106½ and 107; and in the 3½ per cent. at 102½ free and 104½. The Suburban and Provincial group were little dealt in; but they scored numerous advances in quotation. Alliance and Dublin old marked from 19⅞ to 20, ditto new 14⅜, ditto debenture par, Brentford old 249 and 250, Bromley "B" 90, British from 42¾ to 43, Tottenham "B" 103, and West Ham 105. In the Continental Companies, Imperial was very active, and changed hands at from 181 to 184, Union was done at 110½ and 112, ditto preference at from 137¾ to 141, European fully-paid at 22⅛ and 22¼, ditto part-paid at 16¾, and Tuscan at 10⅜. Among the undertakings of the remoter world, Bombay marked 6½, Buenos Ayres 11⅜ and 11⅝, Melbourne 5 per cent. 102⅝, ditto 4½ per cent. 103½, Monte Video 11 to 11 3/16, Oriental 140, Primitiva 6⅜ and 7 1/16, ditto preference 5, ditto debenture 93⅞ and 94, and River Plate from 13 11/16 to 13⅞.

ELECTRICITY SUPPLY MEMORANDA.

Spasmodic Jubilation—The "Sporting Instincts" of the "Electrician"—The Welsbach Challenge—A Suggested Stop-Gap—In Prejudiced Judgment—Why Electric Heating and Cooking Appliances will not Sell.

THE new metallic filament lamps bid fair to add to the humorous side of existence. When a new thing electrical comes along, it takes a little time to "catch-on" in the electrical industry; but when it succeeds in the feat, there is no restraining the men of the industry from shouting in its praise. As their hopes rise, so do their spirits. It is a good thing they get these respites from depression; for, as a matter of fact, they have had a hard battle to wage with very indifferent weapons. A case in point was electric cooking. A couple of years ago the "poisonous" gas-stove was going rapidly to the scrap heap; and householders would have nothing but the clean, cheap, inodorous electric cooker—a multi-pointed character it has failed to maintain. Most electrical engineers are now as silent as the tomb on this subject of electric cooking. The public refused the expensive and provoking things, and stuck tenaciously to gas-cookers; and the electrical prophets retired discomfited. Another bad attack is now on; and metallic filament lamps are responsible. One week we read that these lamps are going to take the "cream" off the gas-mantle lighting business; and another week that it will not be long "before the gas mantle will feel a draught." This may be funny according to the electrical ideal; but there are many hard-pressed central station engineers in the Provinces whose daily experiences keep them in a much less sanguine frame of mind. However, we read that "a tremendous demand for house transformers, compensators, and adaptors has now sprung up, and continues to grow; and the cry for more lamps gathers volume as time goes on." The movement, indeed, is "of such magnitude that it deserves to be called a revolution." But where is this revolution taking place? The answer is found in the same electrical paper: "As might have been expected, the bulk of the new lamps are being put into old installations hitherto run with carbon filaments." Just so. The users of those unmitigable consumers of current, but poor light-givers, the old carbon filament lamps, are glad enough, having gone to the expense of paying for the installation of electricity, to pay something to rid themselves of the old lamps and take on the new, though in doing so, in actual out-of-pocket expenditure, the user may be worse off. He gains the advantage, however, of being able to read and write without straining his eyes. But new consumers will be as hard to get as before. The new metallic filament lamp has not brought electric lighting down to the low level of cost of incandescent gas lighting; it has not reduced the cost of wiring and installation; it has not reduced the cost of renewals; it has not made electricity more reliable—it has not done many things that have deterred people from giving up cheap, efficient, and reliable incandescent gas lighting. Moreover, the gas people are not asleep in keeping householders well acquainted with improvements in gas lighting. Given a little time, those electrical people who are in the seventh heaven of delight will be on *terra firma* again.

Our amiable contemporary, the "Electrician," asserts that it has had its "sporting instincts" roused; but we have applied all sorts of tests to what follows, and fail to find a shred of evidence supporting the assertion. It is over the challenge of the Welsbach Company to the General Electric Company to participate in a test to justify (if they are able), under fair and practical conditions, certain definite statements that the latter have repeatedly made, that the Osram lamp has brought electric lighting down to a lower level in cost than gas lighting. The General Electric Company have judiciously kept clear of any attempt at vindication; and when we read the solemn declaration of the "Electrician" that its "sporting instincts" had been roused, we were hopeful that it was prepared to do what the General Electric Company shrink from doing—take up the challenge, and have the matter out. But nothing of the kind. All that the "sporting instincts" resolve themselves into is a lame excuse why the General Electric Company should not accept the challenge. This is the excuse; and the humour of it, and the bad testimonial that it is for the Osram lamp, will both be seen at a glance: "It is not surprising, however, that the General Electric Company would not accept the challenge, as the proposal is scarcely a fair one. The Osram lamp *is barely out of the experimental stage*, and is only feeling its way. It has not yet been made for small candle powers on high-pressure circuits, and *is therefore unsuited for all the requirements of internal lighting*." When the General Electric Company issued their advertisements and inspired articles on the Osram lamp, they made no mention of the lamp being barely out of the experimental stage, but put it forward as a perfected weapon with which to fight the incandescent gas-burner, and made the specific assertion, and quoted unsubstantiated figures to show, that using the Osram lamp the cost of electric lighting would be lower than that of gas lighting. It is to give them an opportunity to publicly prove their own published and aggressive assertions, and to substantiate their own figures, that the challenge has been made. Hence the futility of the interposition of the "Electrician" with its feeble excuse.

But to the excuse is attached the suggestion that, "as a stop-gap, the lighting of Cannon Street and Queen Victoria Street might be compared on similar terms." Would that they could be. The wrigglings of the electrical people, in connection with street flame arc lighting, from everything that has the semblance of a fair and proper commercial base, are wonderful to behold. This was a matter treated upon, specially with regard to the Cannon Street lighting, in our editorial columns on Jan. 14; and we know how, in connection with the Oxford Street lighting, the initial expenses incurred in installation, amounting to some thousands of pounds, were made an immediate and direct charge upon the general rates.

While mentioning these matters, the "Electrician" devotes a few sentences to pointing out that the "JOURNAL" week by week calls attention "to the errors and misrepresentations perpetrated by those interested in electric lighting." Then it proceeds: "Any data available are seized with avidity and commented on in curiously distorted fashion." Our contemporary is evidently smarting over something; and certainly it does not do itself justice in dealing in generalities in this fashion. Let it give some few instances in which data have been presented in "curiously distorted fashion;" and we shall be fully prepared to deal with the accusation. Meanwhile, a few singular items cross the memory that have appeared in the "Electrician." We will not go farther back than to the celebrated statement that actually appeared in one of its editorials to the effect that the "fumes" coming from a high-pressure gas-lamp outside the Mansion House were absolutely so dense as to be visible to—was it the eye or the camera? Of course, that was a "curiously distorted" statement. Other instances need not be raked up; but one of the last absurdities of our contemporary was a comparison of cost between a flame arc lamp in the Devonport Dockyard and an ordinary incandescent mantle giving 20 candles per cubic foot of gas consumed. People who live in glass houses should exercise discretion when they are prompted to throw stones.

A week or so ago a letter appeared in the "Electrical Review," over the pseudonym "Agnostic," in which the writer's intention appeared to be to put people on the right track as to why electric cooking and heating apparatus would not sell. The question, according to "Agnostic," is reduced to one in which the manufacturer of the appliances, the central station engineer, and the local electrical contractor are each trying to get the better of the other, instead of the manufacturer and central station engineer

patting the contractor on the back, and encouraging him to make the business go. We are afraid that this gentleman is overrating the powers of the local contractors in this matter. They can no more work this business up to anything of a notable character than can the man in the moon. There is a great deal of cost attached to electrical apparatus of the kind; and the average householder, not even to please an electrical contractor, will go to the expense of installing such appliances in his house, when he knows perfectly well, from the experience of others, that the exorbitant cost of installation is but the beginning of paying dearly for service rendered. In the first place, there is the expense of installation; and the only pregnant remark we shall take from "Agnostic's" letter is that such apparatus "requires installing, and a great deal of explaining"—it cannot be dumped down in a house like a sewing-machine. Some of the apparatus is really wonderfully and fearfully made; and if a sight of it does not frighten a householder, then the prices for the apparatus itself will in most cases do so. For instance, how will the housewife regard a one-pint water-heater at 18s. 6d., a quart one at £1 1s., or a 2-quart one at £1 15s.? Or, again, a 7-inch frying-pan at £1 5s.; or a 10-inch one at £2 5s.? Or a little electric grid at £2 15s., £3, or £3 5s.? Or an electric "oven," only 18 in. wide, 16½ inches high, and 14½ inches deep, at £6 2s. 6d. or £6 12s. 6d.? For what a quart kettle, a 10-inch frying-pan, an electric grid, and an electric oven would cost, to say nothing of the installation, the lady occupant of a suburban villa or flat would expect in these times to buy a new drawing room suite or a new piano. But supposing a householder does not mind being extravagant once in a way, and invests in such appliances, the time occupied by the operations confided to their tender mercies, and the cost, will not heighten joy in the new possessions. There are more reasons than the want of the cultivation of the local electrical contractor why electric heating and cooking appliances are difficult to sell.

FROM NONSENSE TO UNTRUTH.

In the "Journal" for Jan. 21, attention was drawn to "A Column of Nonsense" that had been contributed to the "Daily News" by Mr. Chiozza Money, M.P., on the subject of cooking by electricity; and he subsequently, in the same newspaper, followed this up by another article on "Pots and the Woman," in which this specious journalist-politician went from bad to worse—from what was merely nonsensical to what was absolutely untrue. Were it not that erroneous statements and misleading assertions on technical matters in the Daily Press are read and believed by such a large number of people, we should take no notice of such absurdities and misrepresentations; we should not further advertise the perpetrators of these inaccuracies. But as a good start and a wide circulation are given to them, we feel in duty bound to correct and contradict them whenever the opportunity occurs. Further than this, we admonish all gas engineers and managers, directly and whenever these bad and counterfeit coins are circulated, at once to nail them to the counter in the local or general Press, and by pamphlets and all means in their power to stop the mischief they may do. It is with such an object that our "Illuminating Truths" are published.

And now for Mr. Money's exaggerations and untruths. "Here," he says, "is West Ham in possession of the most enterprising electric business I have ever heard of, already accomplishing miracles." Yes, very likely; but, as was shown in the "Journal" for Oct. 1 last, in "Electric Lighting Memoranda," the miracles are those appertaining to the figures of the balance-sheet, and not to accomplished facts. This "most enterprising electric business" of the West Ham Corporation has a deficiency of £1829. As a contrast, it may be said that the net profit of the West Ham Gas Company for the last half year was £27,355. "In the last two years," Mr. Money goes on, "West Ham has determined to make electricity cheaper than gas; and it has succeeded." How easy it is for the facile pen of a daily journalist to repeat, unchecked and unweighed, the irresponsible and stock phrases of an electrical leaflet! Curiously enough, at the very time (Jan. 28 last) in our "Correspondence" columns, actual figures were given to show the hollowness and fallacy of such a preposterous claim. The fact is, of course, that at West Ham electricity (at 3d. per unit) for lighting is about six times the cost of gas (at 2s. 9d. per 1000 cubic feet). This is upon the basis of the ordinary 3½ cubic feet vertical incandescent burner and mantle giving 64-candle power, compared with four carbon filament electric lamps each of a nominal 16 candles. This is without doubt to-day the most generally fair comparison; for in each case, these are the most usual and popular methods of obtaining internal illumination. But even if the latest and most effective and economical means of obtaining light by gas and electricity are taken and compared, the result is still (as our readers are well aware) largely in favour of gas. Thus if two osram electric lamps of 32 nominal, but about 28 actual, candle power, each consuming, on the most favourable electrical figures, 1·2 watts per candle, are compared with two inverted bijou gas-mantles, electricity is still, on the West Ham prices, one-and-a-half times as dear as gas. But, as we show in "Illuminating Truths" No. 7, the osram lamp is not yet beyond the experimental stage; and it is ordinarily unusable at the customary high voltages (200 and more), is variable in its lighting effect, and cannot be fixed at an angle. None of these, or similar, drawbacks apply to the inverted gas-burner. Further, the expense of renewals of the osram lamps alone prevents it from making it a fair comparison to take against the cheaply-renewed bijou mantle. As for heating, with current at 2d. per unit, Mr. Money is apparently amazed that "an electric pint kettle will boil a pint of water every morning for three months for 1s. 7d." How wonderful! 90 pints of water boiled electrically for 19d.—in a kettle, we suppose costing £2 or £3. That comes to 4¾ pints boiled for 1d., when for the same penny spent at West Ham, the gas customer could boil 40—not 4 pints." Mr. Money points out "that the 1s. 7d. might be 7d. or less if the nation owned its own coal, its own railways, and its own power"—without paying for them, we suppose that means. Even now, with this 7d., the wise householder who uses gas at West Ham could get 212 cubic feet and boil his morning pint, not only for three months, but for ten months.

There is a very interesting reason given to Mr. Money by "an expert" as to why "West Ham cannot yet sell women cheap electric cookers." Says the expert: "This is not because it is impossible to manufacture electric cooking utensils at a low price, but principally because the average electric supply engineer is not a 'pusher,' and is generally chary of taking up anything new until its reliability is thoroughly proved to him." Oh wise, but "unpushful," electric supply engineer! And so if the poor, hard working woman of West Ham wants the luxury of an electric flat-iron to do her little ironing, she must pay "15s. to 20s.," or enough to keep her family in food for a week or more. And then also the iron or the cooker (costing pounds) may not be "reliable!" Perhaps Mr. Money's boldest and falsest statement is that "the gas and steam engines have been scrapped" at West Ham and "electricity is everywhere." A direct illustration of the very contrary being the truth is the fact that at the West Ham saw mills, after repeated attempts at electrical driving, the electric motors were superseded; but we will not use Mr. Money's misleading and exaggerated word and say they were "scrapped." We have not the actual figures at hand to show the present number of gas and steam engines in use; but at this very time, we read in the pamphlet recently issued by the West Ham Gas Company that "the supply of gas-engines has also just been undertaken." The same pamphlet (see "Journal," Dec. 31, 1907, p. 991) further reminds us that the local consumers number nearly 60,000; that there are 10,500 gas fires and cookers (apart from slot installations); and that the gas supply has trebled itself in the last 18 years. So much for the ubiquity of electricity.

Mr. Money commences his article with a reference to "airing Utopian views." His views are not "Utopian," but false—like his facts. He closes with "An advertisement" of West Ham as "one of the greatest and most advantageous manufacturing centres of the South of England." Manufacturers, he says, may, "through diligent reading of partial information," confuse the West Ham Corporation with the "Guardians." We have no intention of doing so. But there cannot be any danger, after Mr. Money, M.P.'s two columns of nonsense and untruth, of mistaking him for anything but a reader and writer of "partial information."

A Daylight-Saving Bill.

As many of our readers may be aware, a Bill has been introduced by Mr. Robert Pearce, the Member for Leek (who is supported by Sir William Bull and Mr. Horniman) to "promote the earlier use of daylight in certain months yearly." It is an attempt to obtain legislative sanction for a scheme propounded by Mr. William Willett, of Sloane Square, which was noticed in the editorial columns of the "Journal" July 23 last. The Bill consists of only five clauses, of which the first and second are the most important. They are as follows: "(1) The hour between two o'clock and three o'clock in the morning of each of the first four Sundays in April in each year shall be a small hour consisting of 40 minutes only, but shall otherwise be reckoned a full hour for all intents whatsoever in the United Kingdom. (2) The hour between two o'clock and three o'clock in the morning of each of the first four Sundays in September in each year except 1908 shall be a long hour consisting of 80 minutes, but shall otherwise be reckoned a full hour only for all intents and purposes whatsoever in the United Kingdom." Greenwich time, as used for the purposes of astronomy and navigation, is not to be affected by the Act; but whenever any expression of time occurs in any Act of Parliament, deed, or other legal instrument, the time mentioned or referred to, unless it is otherwise specifically stated, is to be held in the case of Great Britain to be Greenwich mean time as varied by the Act, and in the case of Ireland, Dublin mean time as so varied. The variation of time established by the Act is to be known as "British time." The Act is to apply to the United Kingdom of Great Britain and Ireland, and may be cited as the Daylight Saving Act, 1908. The Bill was down for second reading last night after Supply and three Government Orders of the Day.

The London and Southern District Junior Gas Association will meet next Friday, at the Cripplegate Institute, for the purpose of hearing a lecture by Mr. J. W. Helps, of Croydon. Arrangements have also been made for the members to visit the Nine Elms Works of the Gaslight and Coke Company, on Saturday, the 22nd inst.

SULPHUR IN VERTICAL RETORT GAS.

THE fact that the gas made in vertical retorts differs considerably from that made from the same coal in horizontal or inclined retorts in respect of the amounts of cyanogen, ammonia, and naphthalene present in it has led the Imperial Continental Gas Association and the German Continental Gas Company to undertake investigations in their laboratories on the proportion of sulphur, other than sulphuretted hydrogen, in the gas made in vertical retorts. The results of these investigations are published in the "Journal für Gasbeleuchtung" of the 1st inst., whence we have made the following summary of them.

It may be premised that, in accordance with Continental practice, the gas in all cases has been purified by means of oxide of iron, so that the sulphur referred to is that which persists in the gas after such purification, and is therefore chiefly in the form of carbon disulphide. The inclined retorts at the Gitschiner-Strasse (Berlin) works of the Imperial Continental Gas Association, from March to October last year, carbonized 71 per cent. of English coal, 1 per cent. of Westphalian coal, and 28 per cent. of Silesian coal. The sulphur in the gas made, tested by the Gas Referees' method, averaged 28 grains per 100 cubic feet—ranging from 24 grains for October to 33 grains in May. The following table shows the proportions of English, Westphalian, and Silesian coals carbonized in the 5-metre (16·4 feet) deep Bueb vertical retorts at the Oberspree works at Berlin on certain days in the same year, and the amounts of sulphur found in the gas by the same method of estimation:—

Date. 1907.	Proportion per Cent. of each Description of Coal Carbonized.			Sulphur in Gas. Grains per 100 Cubic Feet.
	English.	Westphalian.	Silesian.	
Oct. 15 . .	100·0*	—	—	12·18
,, 17 . .	33·2	66·8	—	13·93
,, 19 . .	32·6	54·4	13·0	13·73
,, 20 . .	32·0	54·0	14 0	10·51
,, 22 . .	34·6	50·4	15·0	15·53
,, 25 . .	35 6	33·5	30·9	11·15
,, 29 . .	35·1	32·6	32·3	16·28
,, 31 . .	43·6	43·6	12·8	13·48
Nov. 2 . .	40·5	40·5	19·0	11·71
Means . .	43·0	42·0	15·0	13·30

* The English coal carbonized on Oct. 15 was Lambton.

The detailed comparisons furnished by the German Continental Gas Company are between the gas made in horizontal retorts in the first half of October and five days in November and December, 1906, at their Dessau works, and that made in the 4-metre (13·1 feet) deep vertical retorts at the same works during the latter half of October, in November, and for eight days of December, 1907. The coal carbonized was English and Westphalian, either separately or mixed in varying proportions; and the sulphur in the gas was determined by Drehschmidt's apparatus, which is very similar to that of the Gas Referees. The following are the monthly means of the sulphur tests at the Dessau works:—

Month.	Sulphur, in Grains per 100 Cubic Feet at 60° Fahr. and 30 inches.	
	Horizontal Retort Gas (1906).	Vertical Retort Gas (1907).
August	50·52	—
September	55·62	—
October	41·77	21·72
November	44·81	20·73
December	37·10	22 42
Means	45·96	21·62

It would appear from these figures that the sulphur in the gas made in vertical retorts is considerably less than in the gas made in inclined and horizontal retorts. The original communication states that this difference is doubtless due to the less extent to which the gas is superheated in the vertical retorts; so that it is not there subjected to the temperature requisite for the formation of carbon disulphide. The fact that the sulphur in the vertical retort gas at Dessau averaged 21·62 grains, and at Oberspree only 13·30 grains, is said to be chiefly due to the higher make of gas obtained at the Oberspree works, through the more liberal admission of steam to the retorts.

These explanations are obviously not wholly satisfactory. If the last argument is accepted, the difference between the amount of sulphur in the gas made in vertical retorts and that in the gas made in other retorts may equally legitimately be ascribed to the admission of steam in the vertical retorts at both places. Thus we should have: With much steam 13·30 grains of sulphur, with little steam 21·62 grains, and with no steam 28 (or 46) grains. Obviously the figures are not strictly comparable. But it may well be that the reduced proportion of sulphur in vertical retort gas is only in small measure due to the form of the retort, and is in part due to increased make, and, still further, to the direct action of the steam. It is a well-known fact that water gas is comparatively free from sulphur compounds other than sulphuretted hydrogen, even when highly-sulphurous coke or anthracite is used for its production; and hence gas obtained by the action of steam on carbonaceous fuel in any form of retort is likely to contain little sulphur. How much of the reduction indicated by the foregoing figures is really due to the Oberspree and Dessau retorts being vertical and less strongly superheating, and how much to other causes, such as increased make and the action of steam, is not clear. It might be possible to draw useful inferences in this direction if the make per ton were stated in all cases, and the amount of steam used or an analysis of the gas given for the vertical retorts.

The figures, moreover, are seldom comparable, for the reason that the proportions in which the different coals have been carbonized necessarily are not often the same. We have picked out a few results from the Dessau figures which may more fairly be compared. For instance, on seven days in October, 1906, only English coal was carbonized in the horizontal retorts; and the sulphur averaged 42·25 grains per 100 cubic feet—ranging from a minimum of 37·27 to a maximum of 48·21 grains. On four days in October, 1907, only English coal was carbonized in the vertical retorts; and the sulphur in the gas averaged 21·74 grains—the minimum being 16·18 and the maximum 24·30 grains. Here a very marked difference appears in favour of the vertical retort. But before ascribing it to that retort, we should like to know that the English coal was the same in 1906 and 1907, what was the make per ton, and whether steam was introduced in the one type of retort and not in the other. Perhaps it is not too late for the German Continental Gas Company to supplement the valuable figures already given by these data. This additional information should be highly instructive from several points of view; and we hope, by the courtesy of the Company, it may be forthcoming.

CONFERENCE OF REPRESENTATIVES OF THE JUNIOR GAS ASSOCIATIONS.

A CONFERENCE of representatives of the Junior Gas Associations was held at the Midland Hotel, Birmingham, last Saturday, when there were present two representatives from each of the English Junior Gas Associations, and one from the Eastern District of the Scottish Junior Gas Association. A representative was expected from the other Scottish Junior Association; but at the last moment a telegram was received, stating that he was unavoidably detained in Scotland. The second representatives from the Scottish Associations had previously intimated that they would not be able to be present.

Mr. W. E. Caton (the President of the Midland Junior Association) was voted to the chair; and the following resolutions were carried unanimously. They will subsequently be laid before the members of the various Junior Associations, by the respective representatives, for their consideration and decision.

"That two representatives from each Junior Gas Association meet annually to discuss matters of general interest to the members of these Associations."

"That the next conference of representatives of the Junior Gas Associations be held at Manchester in February next; and that the Manchester Association be asked to provide an Honorary Secretary to make the necessary arrangements."

"That, at the invitation of the representatives of the London and Southern Association, a general gathering of the Associations take place in London during the Franco-British Exhibition, towards the end of September next."

"That the Junior Associations hold their meetings, so as to prevent unnecessary clashing, as follows: The Manchester Association, in the week ending on the first Saturday of the month; the Midland, in the week ending on the second Saturday of the month; the Yorkshire, in the week ending on the third Saturday of the month; and the London, in the week ending on the fourth Saturday of the month. The Scottish Associations to hold their meetings in the weeks ending on the first and third Saturdays or in the weeks ending on the second and fourth Saturdays, both respectively."

On the conclusion of the business, a vote of thanks to Mr. Caton for presiding and to Mr. James Hewett (Hon. Secretary of the Midland Junior Association) for performing the secretarial duties, was carried and acknowledged.

Institution of Civil Engineers.—At the meeting of the Institution last Tuesday, the monthly ballot resulted in the admission of Mr. A. H. P. Davey, of the Guernsey Water-Works, and Mr. R. Vivian Morris, as associate members; and of Mr. Malcolm R. Aird, a son of Sir John Aird, Bart., as an associate.

A Large Spiral-Guided Holder.—Following on the satisfactory working of the Widnes four-lift spiral-guided holder, of which a full illustrated description appeared in the "JOURNAL," dated Feb. 5 last year (p. 341), it is worthy of note that the Newcastle-on-Tyne and Gateshead Gas Company have decided to erect a four-lift spiral-guided holder of 3,100,000 cubic feet capacity, which will be the largest holder of this type erected. They have accordingly placed the contract with Messrs. R. & J. Dempster, Limited, of Manchester.

TWO GRAPHIC ILLUMINATION CHARTS.

INCREASED interest in the computation of illumination values has necessarily brought in its train devices intended for the simplification of calculation; and from the United States hail two charts constructed graphically to this end. The first was presented by Mr. Albert F. Parks, as a contribution to the proceedings of the Illuminating Engineering Society at the Boston meeting; the second is published by Mr. C. W. Kinney in the "Illuminating Engineer" for December. Both charts are interesting, and, it may be, serviceable to those who have frequently to work out illumination values. Given the polar photometrical curve of any light source, and its altitude, the illumination value at any particular point on the horizontal plane can be quickly found. It is pleasant to see that both authors keep to the term "foot-candle," which is now an expression familiar enough to everybody.

The first chart (that by Mr. Parks) is ingenious and well worth a study. The equation upon which it is based is—

$$I = \frac{C}{H^2} \cos^3 A \qquad \text{where}$$

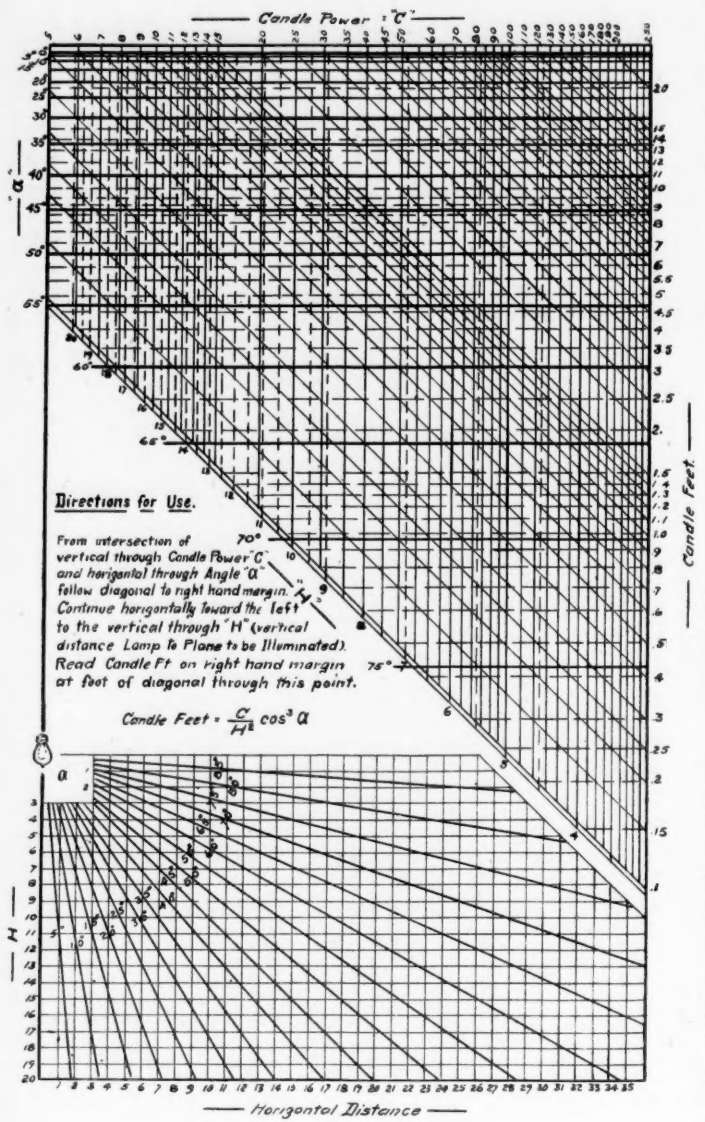
I = Illumination in foot-candles normal to the plane to be illuminated.
C = Candle power reading from a photometric curve.
A = Angle made by reading C with normal to plane illuminated.
H = Minimum distance from source of illumination to this plane.

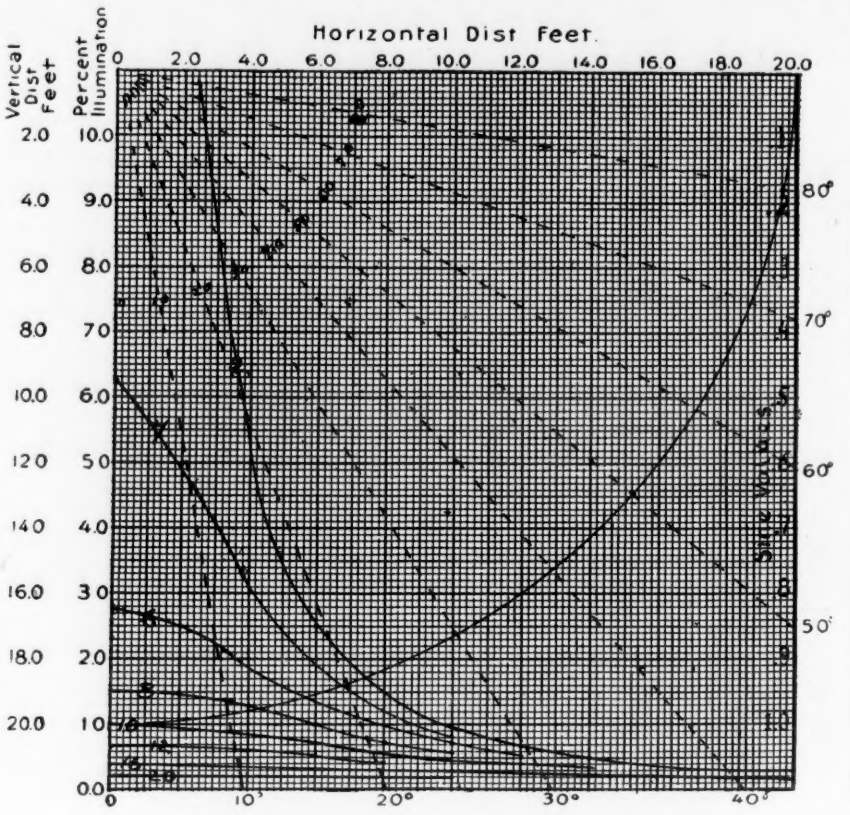
It will be noted that the use of this equation for the diagram discounts, to the extent of the cosine law, the full value of light which may be received by any plane at right angles to the line of light. The author, after describing and illustrating the method of constructing the chart, gives examples of its use.

It is assumed that it is desired to find the foot-candle illumination on a plane 6 feet below the source of light. The photometric curve of the luminant shows 50-candle power in a vertical direction, and 100-candle power at an angle of 45°. In the case of the 50-candle reading, as "A" is *nil*, find 50 upon the candle power "C" scale, and follow the diagonal line therefrom to the right-hand margin, reaching the point 5. From this read horizontally to the left as far as the vertical line 6 (*i.e.*, 6 feet) projected from the lower inclined margin. From the intersection, the diagonal line (again towards the right-hand side) yields the foot-candle value of 1·4.

In the second case, 100 is found on the top or "C" scale, and the vertical line is followed till the horizontal line from 45° on the "A" scale is intersected. From this point the procedure is the same as before. The diagonal is followed to the right, reaching the figures 3·5; reading to the left to the vertical line 6, the new diagonal from this point to the right-hand margin will yield 1 foot-candle as the result.

The use of the chart may be reversed. If, for instance, it be desired to construct a photometric curve that will produce a uniform illumination of 1·5 foot-candles upon a plane 7 feet below the light source, the readings are taken backwards. Starting from 1·5 on the right-hand margin, find the intersection of the diagonal with the vertical line 7; follow horizontally to the right-hand margin; and from this point continue up the new diagonal toward the top, and where this diagonal cuts the several degree lines overhead on the top scale will be found the required candle-power readings. For instance, 205-candle power at 45°; 165-candle power, at 40°; 132-candle power, at 35°; 110-candle power, at 30°; 96-candle power, at 25°, &c., to 72-candle power at zero. Other


Candle Power "C"
Candle Feet
Directions for Use.
From intersection of vertical through Candle Power "C" and horizontal through Angle "A" follow diagonal to right hand margin. Continue horizontally toward the left to the vertical through "H" (vertical distance Lamp to Plane to be Illuminated). Read Candle Ft on right hand margin at foot of diagonal through this point.
Candle Feet = C/H² cos³ A
Horizontal Distance



applications of the chart will suggest themselves. The angle diagram at the bottom of the chart is only added for convenience, and is not involved in the working of the chart.

The second graphic chart now reproduced has been developed by Mr. C. W. Kinney for the quick solution of lighting problems in which the illumination depends upon one or two sources. The known quantities are respectively the usual polar photometric curve, the vertical height of the source of height above the plane in which the point to be lighted lies, and the horizontal distance of this point from a point directly under the light and in the same plane.

With these known quantities in mind, the curves are plotted with reference to the horizontal distance. The curve values are the reciprocals of the squares of the actual distance from the source. In other words, the direct light is not discounted by the cosine law calculation as in Mr. Parks's chart. Mr. Kinney, however, says that similar sets of curves have been plotted the values of which take this into consideration. The author plots the respective altitudes at which the light source may be fixed, and numbers them according to the height. For instance, curve 2 refers to a horizontal plane 2 feet below that of the light source. The "vertical distance" and "horizontal distance" intersections in connection with the dotted lines of the chart, give the angle for reference to the polar candle-power curve.

The following is briefly extracted as an example of the use of the chart. It is required to light a point in a plane 4 feet below the source and at a horizontal distance of 6 feet, with an intensity of 1 foot-candle. From the intersection of curve 4 and the 6 feet "horizontal distance" line, the value of 1·9 per cent. is obtained from the left-hand margin. Again, having found the intersection of the 6 feet horizontal and the 4 feet vertical lines, it will be seen that this point, read in connection with the dotted lines, refers to an angle of about 56°. Now, the value of the intensity in foot-candles is equal to 1·9 per cent. of the value of the candle power of the light source; and this at the angle of 56° should be $1 \div 0{\cdot}019 = 52$-candle power. The latter therefore is the candle power at an angle of 56° necessary to produce the desired result of 1 foot-candle—that is to say, if the candle power of the source is 52 along the 56° line, the illumination at a point 6 feet out from the lamp and 4 feet below, will be $52 \times 0{\cdot}019 = 1$ foot-candle. The author has plotted curves for planes two, four, six, &c., feet below the source, and suggests that for intermediate planes the positions of the curves are easily estimated. He adds that a set of "candle-power curves" mounted on cards is very handy for the solution of lighting problems.

WATER BILLS FOR 1908.

[Second Article.]

In the last number of the "Journal," the Bills promoted by Water Companies were noticed. We now deal with the proposals in regard to water supply contained in the Bills of Local Authorities which will come under consideration by Parliament.

The Ammanford Urban District Council Water Bill is to confirm the works as at present constructed and sanctioning the carrying out of others, consisting of a compensation reservoir in the parish of Llandilofawr, an aqueduct, an overflow conduit, and a pipe-line, to be completed within ten years from the passing of the Act. The limits of supply are to be the area under the jurisdiction of the Council, and the charge for water is not to exceed 4s. in the pound per annum on the rateable value of the premises supplied, with an addition of a maximum of 5s. for each closet after the first, and of 7s. 6d. for each fixed bath capable of containing not more than 50 gallons. For water supplied by measure, the maximum charge is to be 1s. per 1000 gallons. Power is sought to borrow any amount up to £17,700 for purchasing land and carrying out the works; such sum as may be requisite for paying the costs and expenses of the Act; and, with the consent of the Local Government Board, whatever further money may be necessary. Authority is asked for the borrowing by the Llandilofawr District Council of such sum as will enable them to contribute to the extent of two-fifths of the cost of the works and of the expenses of the Act, subject to the consent of the Local Government Board. The Ammanford Council purpose keeping separate accounts of the water undertaking. Fifty years are required to repay the amount raised for carrying out the works. [*Parliamentary Agents: Messrs. Bircham and Co.*]

The Bill promoted by the Audenshaw and Saddleworth Urban District Councils is to alter the constitution of the Ashton-under-Lyne and Dukinfield (District) Water-Works Joint Committee, and to make the two District Councils combining authorities; the union to take place not later than the 25th of December next after the passing of the Act. It is proposed to include the Audenshaw district and a specified portion of that of Saddleworth within the limits of supply of the Committee, whose numbers are to be increased by one member from each of the District Councils. The contributions to be made by these bodies in respect of past capital expenditure are to be ascertained by the Standing Arbitrator; and the Councils are to bear their proportion of any future outlay that may be called for. The respective borrowing powers of the existing combining authorities are to be diminished by sums equal to the total of the Councils' proportions of the amounts which the authorities had been empowered to borrow, but had not raised, prior to the combination taking effect. [*Parliamentary Agents: Messrs. Lees, Butterworth, and M'Donnell.*]

The General Powers Bill of the Blackburn Corporation contains three clauses relating to the water undertaking, but only one of them need be noticed. It is to authorize the Corporation to acquire lands for protecting their waters and water-works against nuisances, encroachments, injury, or pollution; and to apply for the purpose any moneys borrowed or to be borrowed under the provisions of section 128 of the Borough Gas, Water, and Extension Act of 1877 as part of the sum of £70,000 thereby sanctioned for water-works purposes. [*Parliamentary Agents: Messrs. Tahourdins and Hitchcock.*]

The Blaydon and Ryton Water (Transfer) Bill is to authorize the sale of the water undertakings of the Blaydon and Ryton Urban District Councils to the Weardale and Consett Water Company and the Newcastle and Gateshead Water Company respectively. The first-named Company are to pay the Blaydon Council £6400, *plus* any amount expended by the Council, with the approval of the Company, in laying new mains within the limits of supply between Dec. 31, 1907, and Sept. 29, 1908—the day of purchase. The Newcastle Company will pay £1600 and any sum spent on mains between Dec. 1, 1907, and Nov 1 next—the date for the completion of the purchase. The Company will also acquire the plant of the Ryton Council for £2500, with a similar provision as in the other cases in regard to money spent on new mains between Dec. 1, 1907, and Nov. 1 next. The two Councils will sell a portion of their joint water-supply plant to the Consett Iron Company for £200, and the remainder to the Weardale Company for £500—both sums to be equally divided between the two authorities, and the purchase to take place on the 29th of September next. On the completion of the various transfers, the obligations of the two Councils with regard to water supply will cease. The purchase-moneys are to be applied primarily in paying off any outstanding loans in respect of the water undertaking; and the balance, if any, is to be used for defraying the costs and expenses of the Act, or applied as the Local Government Board may determine. The Weardale Company ask for authority to purchase certain lands specified, and the Newcastle Company to construct new works, consisting of a service reservoir in the parish of Ryton Woodside, in the county of Durham, and three aqueducts or pipe-lines in connection with it—to be completed within five years from the passing of the Act. Both Companies require authority to make subsidiary works. Nothing is to prejudice or interfere with any right of the two Councils, under the Public Health Act, 1875, or otherwise, to provide or resume the provision of a supply of water in any part of their respective districts in which the Companies are not furnishing, or prepared on demand to furnish, a sufficient supply according to the provisions of their Acts. [*Parliamentary Agents: Messrs. Dyson and Co.*]

The Bill promoted by the Briton Ferry Urban District Council is to obtain an enlargement of their district, and consequently an extension of their limits of water supply, which are to be their district and the parish of Baglan Lower, in the rural district of Neath. The rates for domestic purposes are to be 6 per cent. per annum where the gross estimated rental of the premises supplied is less than £20, and 5 per cent. where it is above this rental; the minimum to be 6s. 6d. per annum. Closets, beyond the first, and bath are to be extras. Meter supplies are to be afforded at a maximum price of 2s. per 1000 gallons; and bulk supplies on agreed terms. The Council wish to borrow for any of the purposes of the Act such sums, beyond those they have power to raise, as the Local Government Board may sanction. [*Parliamentary Agents: Messrs. Sharpe, Parker, and Co.*]

The General Powers Bill of the Burnley Corporation seeks (*inter alia*) to obtain authority to construct additional water-works, consisting of a reservoir in the township or parish of Worsthorne-with-Hurstwood, two catchwater drains or conduits, five aqueducts, and diversions of a road and footpaths—all to be completed within ten years from the passing of the Act. The Corporation ask permission to borrow for water-works purposes the sum of £215,000, to be repaid within sixty years of the time of raising the money. [*Parliamentary Agents: Messrs. Lewin, Gregory, and Anderson.*]

The Bury and District Joint Water Board Bill is to obtain an extension of time for the compulsory purchase of lands required for works authorized by the Board's Act of 1903, and for their completion. For the lands referred to, it is proposed to extend the time to the expiration of seven years from Aug. 14 next. The works mentioned in the Bill are the Scout Moor high-level reservoir and the New Hall and Scout Moor reservoirs; and an extension of time to two years from the above-named date is asked in respect of the high-level reservoir and to twelve years for the other two. [*Parliamentary Agents: Messrs. Lewin, Gregory, and Anderson.*]

The Conway and Colwyn Bay Joint Water Board seek confirmation of the construction of the existing water-works, and power to make subsidiary ones and abstract water from Lake Cowlyd. Provision is made in the Bill for the Board to enter into an agreement with the Council of any of the constituent districts for taking over the management of the distribution of water within the district of such Council or part thereof, and exercise all or any of their powers in relation thereto. [*Parliamentary Agents: Messrs. Chamberlain, Johnson, and Hartopp.*]

The Criccieth Urban District Council are seeking authority

to supply water, and to acquire the undertaking of the Criccieth Water-Works Company, Limited. An agreement has been entered into between the Council and the Company; and the purchase-money is to be the amount of the award made under it, or such other sum as may be settled by the parties. It is proposed that the transfer shall be effected on the 24th of June next; and the purchase-money is to be paid within one month after the passing of the Act—interest thereon to be allowed from the date of the transfer to the day of payment. Authority is sought by the Council to make and maintain two intakes in the parish of Clynnog and a number of pipe-lines, which are all to be completed within seven years. The water to be supplied by the Council is not to be delivered at a greater pressure than that to be afforded by gravitation from the existing service reservoir of the Company; and the charges for a domestic supply are to be based upon the rateable value of the premises. Where this does not exceed £8, the charge is to be 8s. 8d. a year; where it is higher, the rate is to be £7 10s. per cent.—baths and closets (beyond the first) to be extras. Water required for other than domestic purposes may be supplied by meter or otherwise at a price not exceeding 1s. 6d. per 1000 gallons; and provision is made for affording a supply of water in bulk beyond the Council's limits. Permission is sought to borrow the necessary money for the purchase and incidental expenses, for the repayment of which a period of sixty years is required. [*Parliamentary Agents: Messrs. Baker and Co.*]

The Bill of the Glyncorrwg Urban District Council is to enable them to construct certain works; and they ask for further powers in regard to their water undertaking. The works consist of a storage reservoir on the River Corrwg, and a conduit or pipe-line in connection with it, for the completion of which the Council require ten years. Where the supply of water is by measure, the charge is not to exceed 2s. per 1000 gallons. Authority is asked to borrow £39,000 for the purchase of lands and the construction of works—all to be repayable within sixty years. [*Parliamentary Agents: Messrs. Sharpe, Parker, and Co.*]

In the Bill promoted by the Huddersfield Corporation, further provision is made with respect to the discharge of compensation waters from the works. Section 29 of the Act of 1869 is to be amended in respect of the total quantity of water—viz., 156,960 gallons—required to be discharged daily into the Hoyle House Clough; and in the Bill provision is made that six-sevenths of it is to flow in, in equal quantities per minute, between six in the morning and six in the evening, and the remainder between the latter and the former hour. The occupiers of the Hoyle House Clough Mill may, however, require the relative proportions of the day and night flows to be varied; and they are to bear the expense entailed by these provisions. Similarly, section 26 of the Act of 1890 is to be amended in respect of the compensation water discharged from the Butterley reservoir—viz., 2,258,640 gallons on each ordinary working day, and 1,129,320 gallons on Saturdays. In this case also six-sevenths of the total is to be the day flow and the remainder the night flow; but the mill occupiers may require the proportions varied, and they are to bear the expense occasioned by the new provisions. [*Parliamentary Agents: Messrs. Lewin, Gregory, and Anderson.*]

The part of the General Powers Bill of the Keighley Corporation which relates to the water undertaking opens with a request for an extension, by a period of ten years from the passing of the Act, of the time specified in the Corporation Act of 1898 for the completion of the new Bully Trees reservoir and other works. The Corporation also ask for authority to purchase by agreement the freehold of the Calversyke, Highfield, and Lower Castle Mill reservoirs, now held on lease, and to make arrangements with the Bradford Corporation for obtaining a supply of water in bulk from them for use in Keighley. The Bill contains a provision to the effect that any deficiency in the water revenue is to be made good out of the district fund, which may, if necessary, be increased to meet the extra demand upon it. [*Parliamentary Agents: Messrs. Sharpe, Parker, and Co.*]

NEW ROPE-DRIVEN STOKING MACHINERY.

The Dempster and Toogood System.

With the introduction of the projector type of charging-machine and the pusher type of discharging-machine, it became necessary to have means whereby the speed at which the machine was being driven could be varied as the charge proceeded, in order that the coal might be spread in an even layer throughout the length and breadth of a 20-feet through retort. To achieve this result, electric motive power was installed to drive these machines; and consequently the application of electric motors in retort-houses may be said to be directly due to these machine stokers.

As patentees and makers of this type of stoking machinery, and with the view of meeting the expressed wishes of their clients, Messrs. Robert Dempster and Sons, Limited, of Elland, commenced experiments in their own shops, with the then known methods for obtaining a mechanical variable-speed gear of sufficient power. They found that, while it was quite practical to get the variable speed by means of a pulley having an adjustable diameter, two friction clutches were needed to get the reverse motion for the return of the ram, &c. It will be apparent that such a gear would require a series of clutch-levers and speed-regulating levers, which would have to be manipulated during the few seconds occupied for the stoking of each retort. Such gear would not have been sufficiently handy to compete with the flexibility obtainable with electric motor driving. However, by the unique application of two rope-pulleys having adjustable diameters, in combination with a differential gear, as described below, all speeds, stop, and reversing can be obtained by one handle, exactly as with an electric motor. Therefore this new

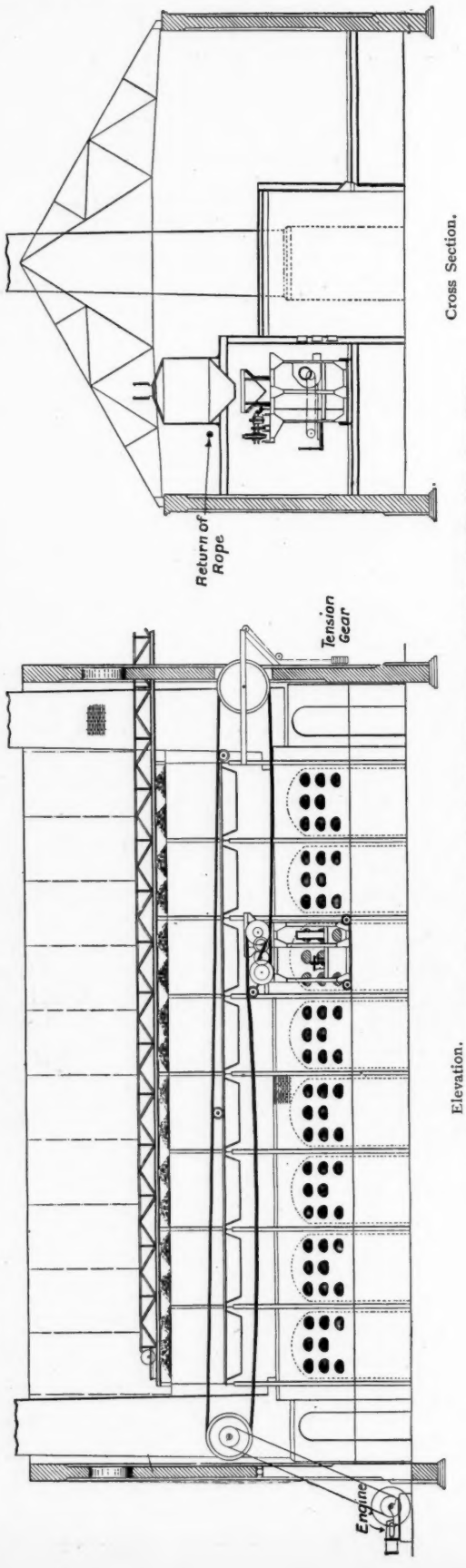


Fig. 1.—General Arrangement of Retort-House with Combined Charging and Discharging Machine, Rope-Driven.

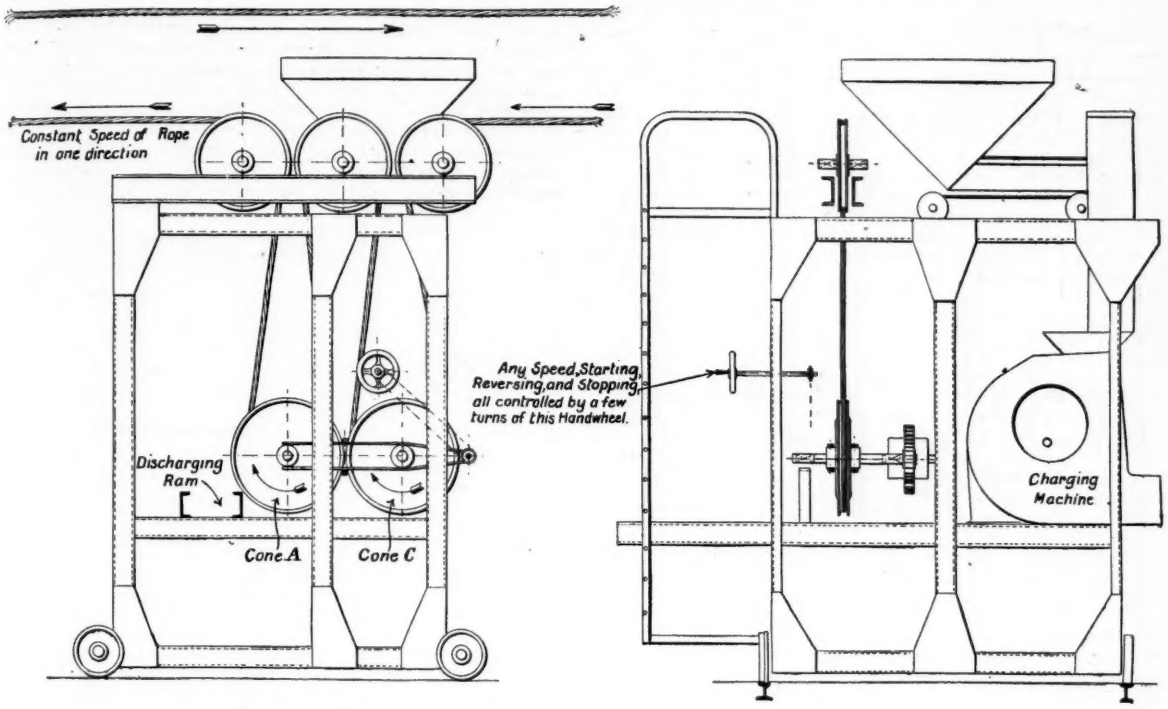

Constant Speed of Rope in one direction
Any Speed, Starting, Reversing, and Stopping, all controlled by a few turns of this Handwheel.
Discharging Ram
Cone A
Cone C
Charging Machine

Fig. 2.—Alternative Arrangement with Expanding Pulleys on a Rising and Falling Platform.

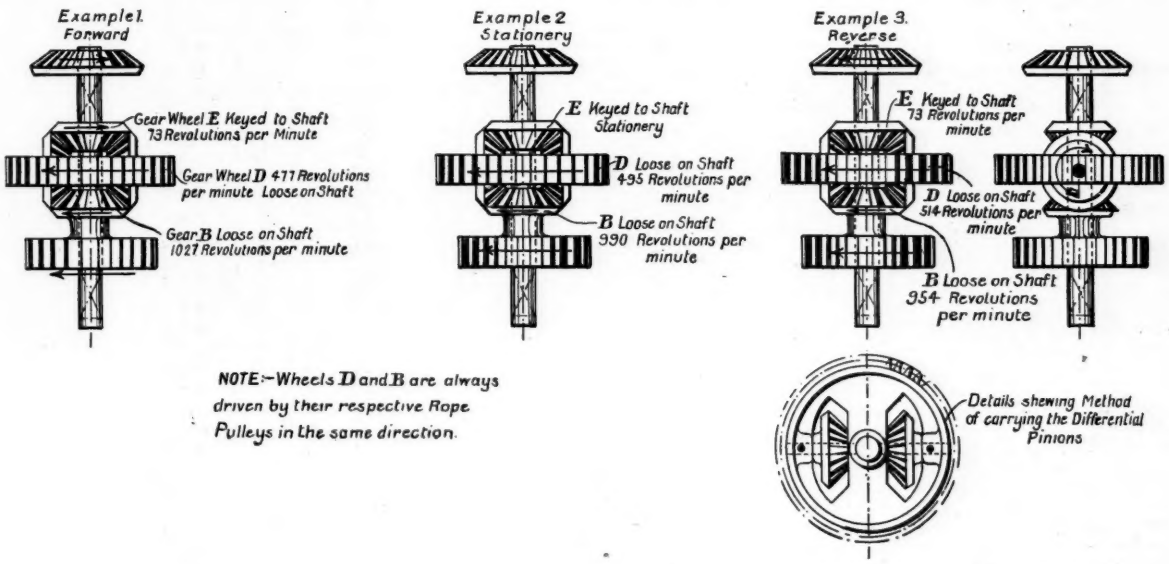
[Owing to there being two cones to adjust, the one balances the other; so that only a slight effort on the handwheel is sufficient to manipulate the gear.]

patent gear may, with advantage, take the place of the electric motor of this type of stoking machinery.

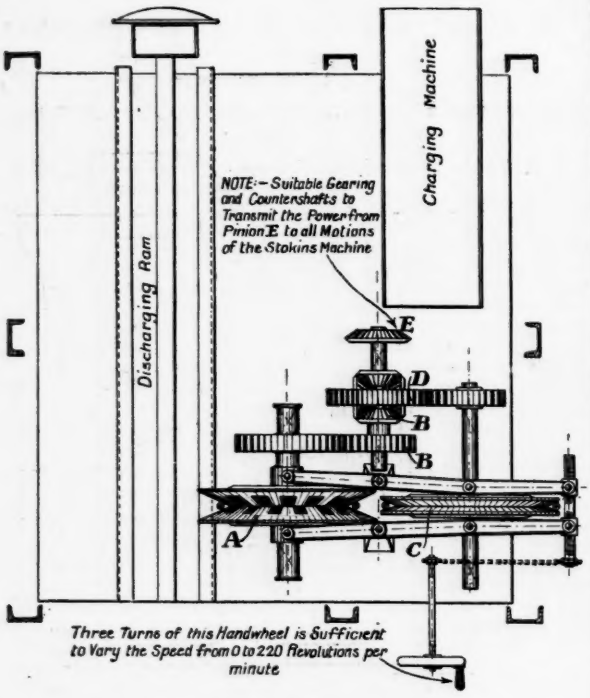
One application of this patent gear to Messrs. Dempster's combined machine is shown in fig. 1; and another, showing the general arrangement of the machine in a retort-house, in fig. 2. From these it will be seen that the gear consists of an endless cotton driving-rope, arranged overhead down the length of the retort-house, engaging with two expanding pulleys on the stoking-machine. These pulleys are formed of cones, so inclined to one another as to give the correct slope for the best working of the rope, and are capable of adjustment while running, so as to increase or decrease their effective diameters by 25 per cent. One expanding pulley is so connected to the other that as one increases in diameter the other decreases in direct proportion, and *vice versâ*. Consequently their speeds in revolutions per minute are variable in inverse ratio to their diameter.

The pulleys are directly connected to a differential nest of gearing, the feature of which is best explained by example. Assuming they are adjusted so as to be of equal effective diameters, the speeds will be equal in revolutions per minute. In this position, neither speed nor power is transmitted to the machine countershaft, as the speed passed into the differential gear by one pulley is exactly extracted by the other. Assuming that the pulleys are readjusted to any intermediate position, the smaller one will run at an increased speed, while the larger one will run at a decreased rate. Consequently the lesser pulley feeds the differential gear faster than the greater one extracts it. The surplus speed will therefore pass onward from the differential gear to the countershaft of the machine, and the direction of rotation of this latter will be either in one direction or the other, according to which of the two pulleys was adjusted to be decreased in diameter.

Here, then, we have a mechanical gear which, with the driving-


Example 1. Forward
Gear Wheel E Keyed to Shaft 73 Revolutions per Minute
Gear Wheel D 477 Revolutions per minute Loose on Shaft
Gear B Loose on Shaft 1027 Revolutions per minute
Example 2 Stationery
E Keyed to Shaft Stationery
D Loose on Shaft 495 Revolutions per minute
B Loose on Shaft 990 Revolutions per minute
Example 3. Reverse
E Keyed to Shaft 73 Revolutions per minute
D Loose on Shaft 514 Revolutions per minute
B Loose on Shaft 954 Revolutions per minute
NOTE:—Wheels D and B are always driven by their respective Rope Pulleys in the same direction.
Details shewing Method of carrying the Differential Pinions

Revs. of Cone A.	Dia. of Cone A.	Revs. of Gear B.	Revs. of Cone C.	Dia. of Cone C.	Revs. of Gear D.	Revs. of Pinion E.	Direction.	
	Inches.			Inches.				
787	24	1112	630	30	445	222	Forward.	
756	25	1068	652	29	461	144	,,	
727	26	1027	675	28	477	73	,,	Example 1.
700	27	990	700	27	495	0	Zero.	Example 2.
675	28	954	727	26	514	73	Reverse.	Example 3.
652	29	922	756	25	534	144	,,	
630	30	890	787	24	557	222	,,	


Charging Machine
Discharging Ram
NOTE:—Suitable Gearing and Countershafts to Transmit the Power from Pinion E to all Motions of the Stokins Machine
E
D
B
B
A
C
Three Turns of this Handwheel is Sufficient to Vary the Speed from 0 to 220 Revolutions per minute

rope running at a constant rate in one direction, permits—paradoxical though it may seem at first sight—of the machine being stopped, started, reversed, and the speed varied at will in either direction gradually over the whole range, or any intermediate speed attained up to 360 revolutions per minute, all controlled by one handle, exactly as in the case of an electric motor. With this gear there are no sliding pinions nor clutches, and no slipping or loss of power takes place; moreover, there is no additional wear and tear over ordinary rope-driving.

The advantages of such gear are obvious. Not only does it save the first cost of the electric installation, but, what is of more moment in gas-works, the average fitter could easily understand and keep in working order something tangible, like a rope-drive, whereas in the case of electric motors he is handicapped by the intricacies of the mechanism, especially when the darkness, as well as the dust, heat, and dirt of a retort-house are considered. Further, while the conditions are the worst possible for the working of electric motors, they cannot injuriously affect the rope-drive. We therefore venture to think that most gas engineers will prefer to adopt a mechanical drive than introduce electricity into their works. It will be obvious that with this gear the gas or steam engine driving the rope should be arranged at one end of the retort-house, so as to drive up to the countershaft carrying the driving-rope pulley.

Carburetted Water-Gas Plant for Rosario.

Mr. R. Lomas, the Engineer of the Sociedad Argentina Luz y Calefacceon of Rosario, on the 21st of December last arrived in England to make arrangements for an installation of carburetted water-gas plant, which was urgently required by the Company in order to meet the increased demand for gas consequent on a reduction in price. In the course of his negotiations, he expressly stipulated that the plant must be delivered f.o.b. Liverpool by the 31st of January, so as, if possible, to be in working order by the 3rd of April. It was considered, however, that this would not allow sufficient time to prepare the necessary drawings and produce the different parts of the plant. In the end, he was assured by the Economical Gas Apparatus Construction Company, Limited, that they could deliver the plant as required; and they were accordingly entrusted with the contract, subject to a stringent penalty for failure to carry it out to time. The matter was settled on the 30th of December. The plant consisted of one set of the Merrifield-Westcott-Pearson special patent design, having a daily capacity of 150,000 cubic feet, including one unit for generating apparatus, two Cornish boilers, each of 150 lbs. working pressure, two blowers, two engines, two of Waller's exhausters, a lift, nine pumps, iron flooring, special yard connections, &c.—in fact, a complete plant for the manufacture of gas. It is gratifying to record that every article was delivered and shipped by the date named. Considering the shortness of the notice and the extent of the contract, we think the punctual execution of the commission is unprecedented in the history of installations of carburetted water-gas plants, and reflects very great credit on the Company entrusted with the order. It may be mentioned that, in addition to the installations carried out during the past twelve months from the London office, in England, the Argentine, and New Zealand (orders for some of them having been given without competition), the Company had a record year at their American office.

JUNIOR INSTITUTION OF ENGINEERS.

International Courtesies.

THE Twenty-fourth Anniversary Dinner of the above-named Institution, which was held in the Victoria Hall at the Hotel Cecil on Saturday, was probably of greater importance to the organization than any of its predecessors, inasmuch as it brought into prominence a new departure by the governing body which may have far-reaching results. It was first made evident in the success of the Council in securing as President for the current session M. Gustave Canet, a Past-President of the Institution of Civil Engineers of France, and known the world over as a constructor of ordnance. By so doing they brought the Institution into touch with the engineering fraternity on the other side of the Channel, and the effect has been to impart to this year's proceedings something of an international character. This was strongly marked in the proceedings on Saturday. On entering the hall, the eye was at once attracted by the flags of the two nations represented at the gathering, which were spread to the right and left of the shield bearing the initials of the Institution fixed on the wall immediately behind the President's chair. It was likewise the keynote of his appreciative remarks in proposing the usual loyal toasts, in which the efforts of His Majesty the King at bringing about a good understanding between France and England were recognized, and testimony was borne to the respect and affection in which the Queen is held. The toasts were honoured with the customary cordiality and the singing of a verse of the National Anthem. With even greater heartiness did the company render in French the first verse of Rouget de Lisle's soul-stirring hymn, "The Marseillaise"—which Carlyle characterized as "the luckiest musical composition ever promulgated"—as the necessary sequel to a request by Mr. Frank R. Durham, Assoc.M.Inst.C.E., the Chairman of the Institution, that they should "raise their glasses" (to borrow an expression from our neighbours) to the President of the French Republic. This demonstration was followed by an exceedingly interesting and appropriate speech by Lord Justice Fletcher Moulton, a Past-President of the Institution, in proposing "International Science." He emphasized the great value of the union of the nations in a common brotherhood and of a *camaraderie* in science—all being united in the same *corps*, and all engaged in fighting ignorance. He pointed out that knowledge should advance and be made practically useful to mankind. Different nations had different ways of applying themselves to this work; and he would grudge none of them any temporary triumph they might achieve in scientific pursuits. The toast was acknowledged by M. le Capitaine Ferber and Colonel Crompton, the President of the Institution of Electrical Engineers.

At this point international subjects were left, and attention was turned to the affairs of the Institution. This was done by Mr. Hay F. Donaldson, M.Inst.C.E., the Chief Superintendent of Ordnance Factories, who proposed the toast of the evening—"The Junior Institution of Engineers." He said he had read with interest the twenty-one years' record of the work of the Institution, which he had received from the Secretary (Mr. Walter T. Dunn), and was pleased to find that the number of members had increased from 900 two years ago to upwards of 1000 now. He noticed that the Institution were in close touch with the Architectural Association; and he hoped the result would be to exercise some control over the erection of the enormously high buildings which were known in America as "sky-scrapers." He referred to the President's world-wide reputation in his special branch of military engineering, and heartily congratulated the Institution on his occupying the chief position. In acknowledging the toast, Mr. Durham remarked that, to employ diplomatic phraseology, their relations with the seniors were most friendly. Though some of the members were no longer juniors, they had not lost sight of the object of the Institution; and it had been decided to further the interests of junior engineers by awarding a medal for the best paper by one in his first year. The monthly "Transactions" were now in their third year, and were found very useful in keeping the members in closer touch with each other. The Institution was progressive, and it was thought desirable to have a more suitable meeting-place than the Westminster Palace Hotel. They had succeeded in obtaining the use of the lecture-room at the Royal United Service Institution. But they had done more than this—they had started a fund with the view of some day building their own home, possibly in conjunction with another body; and the President had laid the foundation stone of the edifice by a contribution of £100 to the fund. The Institution met with a sympathetic reception wherever they went. This year their summer meeting would be in France, and it was intended to visit Paris, Creusot, and Havre. They hoped by going beyond their borders to make their sphere of influence international.

Among the company, in addition to M. le Capitaine Ferber, already mentioned, were two French engineers—M. Juillot and M. le Comte Henry de la Vaulx—who with him had taken part in a discussion on the previous evening on aërial navigation. M. Juillot, it may be remembered, was the constructor, in conjunction with MM. Paul and Pierre Lebaudy, of two dirigible balloons—the "Lebaudy" and "La Patrie"—suitable for use in warfare, both of which have been purchased by the French Government. M. Juillot had attended the meeting in response to an invitation sent to him by the President,

and he and his two compatriots furnished some valuable information on a subject which is just now very much to the front. This fact invested with unusual interest the toast of "Our Guests," which was proposed by Mr. Samuel Cutler, jun., a former Chairman of the Institution. He pointed out that, in addition to these gentlemen, there were present two Past-Presidents—Lord Justice Fletcher Moulton and Mr. W. B. Bryan, the Chief Engineer of the Metropolitan Water Board—and that the work of the Institution embraced every branch of engineering science. At this point the President announced, amid much applause, that their three guests from across the Channel had been elected honorary members of the Institution. The toast was acknowledged in French by M. le Comte de la Vaulx, who expressed his appreciation of the welcome he had received, and assured the members that theirs would be equally cordial when they visited France. Deputy Wallace also replied. The remaining toast on the list—"The President"—was proposed by Mr. Bryan, who remarked that a more ideal President could not have been selected, inasmuch as he had held the position of President of the Institution of Civil Engineers of France. The toast having been most cordially honoured, the President said he was sincerely thankful for the remarks which had been made, and the warmth with which they had been received. To hold the presidency of the Institution was a unique honour. He referred to the fact that the young engineers of the present day have more advantages than those of a past generation, and laid stress on the beneficial effects of travel. When the members had been to France and seen the people, they would learn to like them as he had learnt to know and like the English. In conclusion, he said that he would do his best to promote the success of the Institution, and trusted the year of his presidency would be no less marked than had been those of his predecessors.

The proceedings were shortly afterwards brought to a close. During the evening a selection of music was performed.

MIDLAND JUNIOR GAS ASSOCIATION.

The members of the Association met last Saturday afternoon at the City of Birmingham Technical School, on which day also was held a conference of representatives of the Junior Gas Associations, reference to which will be found elsewhere. During the meeting of the Association,

The President (Mr. W. E. Caton, Derby) said he did not know whether all the members were aware that they had among them that afternoon representatives of the other Junior Associations. There were Mr. E. J. Wellens, the President, and Mr. J. Taylor, Junior Vice-President, of the Manchester and District Junior Gas Association; Mr. H. Rothwell, Junior Vice-President of the London and Southern District Junior Gas Association; Mr. A. Morton Fyffe, the Vice-President of the Scottish Junior Gas Association (Eastern District); and Mr. H. Butterfield, Senior Vice-President of the Yorkshire Junior Gas Association. He need hardly say how pleased they were to have them at the meeting; and he hoped they would join in the discussions.

Mr. E. J. Wellens said that, on behalf of himself and the Manchester Junior Association, it gave him very great pleasure indeed to accept the hearty invitation to attend the meeting, and take part in the discussions. He felt, however, they would be somewhat trespassing on the time at disposal if he and the representatives of the other Associations were to enter very much into the discussions.

Mr. J. Taylor remarked that he was very pleased indeed to see the members of the Midland Junior Association attend in such considerable numbers on a Saturday afternoon to listen to the papers. They had had a meeting earlier that day which he felt sure would be productive of very great good to the whole of the Junior Associations; and personally he should like to express his indebtedness for the courtesy of the President and Secretary of the Midland Juniors for the way in which they had received the representatives of the other Associations. They would all of them remember with great pleasure their visit to Birmingham.

Mr. H. Rothwell said that, on behalf of the London and Southern Junior Association, he could only add his testimony to that of their two friends from the Manchester district who had just spoken. He wished sincerely to thank the President and Secretary of the Midland Junior Association for the kind manner in which they had received the representatives at the little conference which had been held; and to express the hope that all the Junior Associations in Great Britain would benefit from the gathering.

The Papers Read.

The papers which were read and discussed at the meeting were "A Few Notes on a Plant for Concentrating Ammoniacal Liquor," by Mr. R. S. Ramsden, of Burton-on-Trent, which will be found on p. 351; and "The Working of a Carburetted Water-Gas Plant," by Mr. H. E. Temple, of Birmingham, which appears on p. 353.

The Rochdale Town Council last Thursday decided to increase the salary of Mr. T. Banbury Ball, the Gas Engineer and Manager, by £50 as from the 1st ult., and to further advance it by £25 in the next and the succeeding year.

THE COMMERCIAL SIDE OF THE GAS BUSINESS.

By Dr. Alex. C. Humphreys,

President of the Stevens Institute of Technology and of the American Gas Institute.

[An Address to the American Commercial Gas Association.]

I am asked to speak to you on the commercial side of the gas business; and it gives me pleasure to make my small offering towards the forwarding of your important scheme for the maintenance and upbuilding of this business through its commercial side. What I have to say will, I think, be found not inapplicable to industries other than that of gas. We are constantly hearing discussions as to the relative importance of certain elements necessarily found in many undertakings. For instance: Theory *or* practice; college education *or* school of experience education; technical management *or* business management; labour *or* capital. *The* Book tells us: "Eye cannot say to hand, I have no need of thee." If we change the "ors" to "ands" the question in each case is resolved.

To-day in the gas business, as in many other branches of industry, we need to secure the fullest service from those trained to the highest possible degree for efficient commercial management, as well as those specifically trained for the construction and operation of the manufacturing and distributing agencies. It is quite usual to refer only to the latter as covering the technical side of the business. I think it is misleading to confine the term "technical" to that which has to do only with the engineering side. There are technicalities connected with all industries, and they are not confined to the design and construction of plant and to the manufacturing and distributing of the product. Necessarily, in the commercial branch of any important industry, there are special technical elements in addition to those common to all. As an example of the latter, I may cite scientific accountancy.

It is of vital importance that the plant's product shall be of the required quality, and manufactured and distributed at the minimum of cost compatible with the required quality. This means that the plant must be efficiently designed, efficiently constructed, efficiently operated, and efficiently maintained—a wide-enough field in the case of large undertakings to engage the best thought and effort of the best men. But the product must be sold and the proceeds collected. The needs of present and possible purchasers of the product must be carefully studied, and means adopted to meet their wants so far as consistent with the legitimate interests of the sellers. The accounts must be so kept as to reduce to a minimum the loss from bad debts, and furnish the means for complete and competent analysis of results, which can only be done by means of an adequate system of accounting, religiously maintained every moment and at every point.

Here is one of the many places where there must be complete and loyal co-operation between the engineering and commercial sides if the best results are to be obtained. It is to be remembered that the accountant gets many of his primary records from the engineer and those under the engineer's control. If these are incorrect, certainly the final records as found in the general ledger must of necessity be inaccurate; and, for analysis and comparison of records for the purpose of improving results, inaccurately classified accounts may easily be worse than useless. Accurate co-operation of departments is necessarily included in all good business management.

Here let me differentiate between the terms "business" and "commerce." Commerce is defined as the exchange of goods, productions, or property of any kind. Here appears distinctly the element of trading. Commercial is therefore defined as "of or pertaining to, or of the nature of, commerce; mercantile."

Coming to the gas business, in which the engineer, the industrial manager, and the commercial man are all interested, the commercial element has to do with the trading side. Does it follow then that the designing, constructing, and producing engineer is not interested in this part of the business? Is he absolved from all responsibility in this direction? I think not. The man of commerce should here be the responsible specialist. But he requires the co-operation of the engineer—for instance, as to what methods and appliances can be safely and economically employed for converting gas into light, heat, and power. Again, as to the proper classification of accounts. Many other instances could be cited. As the commercial man is charged with the selling of the product, he is also charged with the duty of increasing the sales along lines already established; and here he needs but little assistance from the engineer. But he should go far beyond this; he should keep constantly in his mind the problem of enlarging the field of usefulness for gas. Here he must secure the co-operation of the engineer; and for this service the engineer is more likely to be efficient if he has commercial sense.

This is an age of closer and closer specialization; and necessarily so, in view of the immense strides made of late years in the science of engineering, which have naturally led to a commensurate broadening of the field of commerce. And here we find another question raised: Special training *or* broad training? Again I say, change the "or" to "and." To take more than a minor or subordinate position, a man must be trained as a specialist along one line, and at the same time must be trained to take a comprehensive and comprehending view of the ground

surrounding his specialty; and the man who aspires to take a commanding position in any industry must be sufficiently informed in all things connected therewith to supervise and give general directions to his several heads of departments. Still we must come back to the thought that, after all, for the highest efficiency in any industry, there must be specialization and concentration in the several elements involved in the industry, and the majority must be satisfied to be specialists (that is to say, re-specializing *within a specialty*) if they are to be thoroughly efficient.

As I understand, the members of this Association as such propose to devote their efforts to the improvement of methods and appliances tending to further popularize the use of gas as a source of light, heat, and power. This can in part be done by increasing the efficiency of the appliances, thus giving the same useful effect for a smaller money expenditure, or giving a greater useful effect for the same money; for the gas man, be he connected with the engineering or with the commercial side, must be prompt to recognize that the true interests of the consumers must control. Here, in the long run, duty will be found to be in accord with self-interest.

When I first entered the gas business, about 35 years ago, too many of the gas managers completely failed to appreciate that the interests of their companies and of their customers were largely identical. The gas man was too apt to be dictatorial and careless of the sensibilities and the rights of the gas buyer. The result was inevitable. The public came to believe that the gas business was conducted along unfair lines; that just complaints were disregarded; and that the instrument used to determine the quantity of gas consumed was worse than unreliable.

This has been greatly changed as to nearly all gas companies. To some, the indictment was never applicable, although all were declared guilty. Now it is the exception when a company is found advisedly doing business along these old and bad lines. But this does not mean that the millennium has arrived with us any more than with others. It is only by constant vigilance that we can be sure that our subordinates are treating our customers uniformly with intelligent courtesy.

The commercial side must be keen to observe whether the office men, and especially those at the complaint desk, are sufficiently well informed, and have their tempers sufficiently under control, to meet unreasonable complaints with a pleasant face and convincing arguments. It might be a good test if, when a complaint was made, we expected our men to see that the customer should not only be placated, but, before leaving the office, be persuaded to try an additional gas-consuming apparatus.

In a general way, the commercial side has to do with the selling of the gas which is manufactured and delivered to the house by the engineering side. But, as I have endeavoured to point out, there are certain responsibilities which must be shared by these two departments—perhaps the most important being relations with the public and the municipality which involve technical questions connected with both sides of the business. Many of our progressive companies have wisely established separate departments for the promotion of sales. Fortunately, this advance has not been confined to the largest companies. In these, where there have been established employees' classes or meetings for study and interchange of views, this new business department, including the study of new appliances and improvements in old appliances, is receiving its full share of attention. It is here that a large measure of dependence must rest upon the commercial manager and the appliance manufacturer; and we gas men may well be encouraged by recent great improvements in, and increase in the variety of, gas appliances.

I have already drawn attention to the necessity for concentration and specialization in the conduct of any industry. To refer to the engineering side, see how the advances in engineering science during the last fifty years have brought about a further differentiation. Now, instead of the simple classification of Military Engineering and Civil Engineering, we have the latter divided into Civil (as a section of the field only), Mining, Mechanical, Electrical, Marine, Chemical, Electro-Chemical, Sanitary, &c. Then most of these divisions are being again subdivided and re-subdivided. The gas men and electric light men are not always in opposition; so we find them working together as illuminating engineers. This division and subdivision of the field of engineering necessarily leads to much overlapping; and this has resulted in the discovery that only by affiliation on the part of the several engineering societies can the best results be obtained. Sometimes this effort at affiliation is governed by geographical considerations; but I am particularly referring to professional or vocational affiliation.

At the time of the meeting of the American Society of Mechanical Engineers held a month or two ago, a body of men specially interested in gas power met to form a new society, but decided first to try to work through affiliation with the powerful Society named. This affiliation is now under consideration, in the hope of finding some common ground for efficient co-operation. Many of these men are members of the Mechanical Engineers' Society. Others are not members, and perhaps might be found technically ineligible to full membership. But still they are quite capable of rendering valuable service in the discussion of certain gas-power problems. Here the suggestion naturally follows: Let these men, through a wise scheme of affiliation, work on an equal footing with all others interested as far as this particular branch of industry is concerned, and so secure the co-operation of all eligible to discuss any of the problems of gas power.

I quite appreciate that there are very grave obstacles to be removed before such schemes of affiliation can be put into effective operation. Some of these are real and fundamental, and some have to do with the narrowness of vision with which most—perhaps all—of us are afflicted, though in varying degrees. Here, in gas power, we have what seems to be a somewhat narrow division of the engineering field. From one point of view, it is a division of the specialty of gas engineering, which, in turn, is made up of branches taught under the heads of Mechanical, Civil, Chemical, and Mining Engineering. But gas power would have to include gas-motors; and then would naturally follow carriage building and upholstering. So the carriage builder and the upholsterer naturally come into the discussion of certain gas-motor problems under the general head of gas power; and if the services of these men are to be secured, they should preferably come in on an equal footing. It must be recognized, however, that the doors of our several parent engineering societies cannot be thrown open indiscriminately; and this through no professional snobbishness, though this latter may easily creep in if not guarded against. Also we must have sufficient protection from the patent "crank" and the blatant advertiser. The appliance man must come to these discussions prepared to meet and profit by all fair criticism.

But it is natural that in the main divisions of engineering, as represented by what we may style the parent societies, certain professional considerations should control, necessitating a professional or vocational qualification for membership. Furthermore, just as it has been found convenient, in the interests of efficiency, for the engineers to combine under separate organizations—as, for instance, Civil, Mechanical, Mining, and Electrical—so the same influences lead to the organization of other associations in the interest of other specializations and sub-specializations. The same man often belongs to several of these societies, and still we know that this does not mean that all the societies might profitably amalgamate. We know that it is in the interest of efficiency for them to work under the several heads; and we know further that this necessity for closer and closer specialization will lead some of these same men to combine with others in the organization of other societies still more closely specialized as to purpose. We must, therefore, fully recognize that affiliation does not mean absorption.

Affiliation might be secured by men of a certain interest combining so as to become a co-operative division of a parent society in connection with a part of the parent society's field. But is it not likely that, in turn, this part of the field might have to be subdivided? If so, confusion would follow. As I see it now—though I confess I am not now doing much more than thinking aloud—it would be better to maintain the separate organizations, with working agreements as to interchange of results; the professional society referring special subjects for investigation to the affiliated society, and the two societies meeting for discussion whenever their investigations were sufficiently advanced for efficient joint discussion.

I have hesitated to refer to this subject of affiliation at this time because it is not my custom to speak until I have thought. But, speaking as a member, not as an officer, of the American Gas Institute, I believe that much good can be secured by co-operation between the Institute and your Association. Then the question is: Can this co-operation be secured without loss in other directions? I think it is particularly important that certain able men directly and indirectly connected with the gas business should have the opportunity and the encouragement to meet on an equal footing to discuss the commercial side; and especially should this opportunity and encouragement be offered to those men who are not eligible for full membership of the Institute—for instance, the men who sell to the gas companies the apparatus, supplies, materials, and appliances, upon the quality or the efficiency of which so much of the success of the gas companies depends. There must necessarily be overlapping in the work of the Institute and the Association. This is seen at once by looking over the membership list, which includes the names of many who are active members of the Institute. This partial membership common to both societies should be a strong influence making for an unselfish policy of efficient co-operation.

With all the problems yet to be solved in connection with this industry of ours, many of them having to do with the utilization of our product along new lines for light, heat, and power, calling for the inventing of new and the perfecting of old appliances, we who are directly interested in gas undertakings can well afford to encourage in every reasonable way the full co-operation of all who are capable and willing to render service. So far as my personal efforts and influence can go, they are now and here pledged to a full measure of such co-operation.

Death of Mr. Joseph Evans.

The death occurred on the 31st ult. of Mr. Joseph Evans, senior principal and Chairman of Directors of the firm of Messrs. Joseph Evans and Sons, Limited, the well-known pump makers at Wolverhampton. Mr. Evans, who was 65 years of age, had been ailing for some two or three years; but his death took place somewhat suddenly. He was the eldest son of the late Mr. Joseph Evans, who established the original firm. Deceased was a member of the Wolverhampton Chamber of Commerce, and in April last was made a Justice of the Peace for Staffordshire.

A FEW NOTES ON A PLANT FOR CONCENTRATING AMMONIACAL LIQUOR.

By R. S. Ramsden, of Burton-upon-Trent.

[A Paper read before the Midland Junior Gas Engineering Association, at Birmingham, on Feb. 8.]

Before giving a description of the plant for concentrating ammoniacal liquor at the Burton-upon-Trent Gas-Works, it will perhaps be as well to state that the manufacture of sulphate of ammonia was first commenced in 1892, when a plant designed to deal with 30 to 35 tons of crude liquor per 24 hours was put down in a building 45 ft. by 25 ft., erected specially for the purpose.

The plant consisted of a steam wall-pump for lifting crude liquor from the underground store-tank to an overhead tank formed of an old egg-ended boiler; a heater with cast-iron tubes for the crude liquor (which tubes, by the way, were renewed for the first time last summer after about 15 years' work); a cast-iron cylindrical still; a rolled lead "fishing" saturator; a sulphate drying and stacking floor; a waste-gas condenser; and two open-topped, brick-walled oxide purifiers, 17 ft. by 10 ft. by 5 ft. As the works boilers were over 300 yards away, a separate second-hand Lancashire boiler, 18 ft. by 6 ft., complete with mountings, setting, and chimney, had to be installed as well. The still is of the continuous type, and consists of a series of shallow trays, over which the liquor gradually flows in a downward direction; the trays being covered with cast-iron hoods with serrated lower edges, and communicating with one another by means of trapped overflows placed alternately on opposite sides of the still. In the upper portion of the still, free ammonia is driven off; then milk of lime is added in a large central chamber, and in the lower portion the fixed ammonia is liberated. Steam is admitted to two perforated coils in the still—one in the lime chamber, and the other in the chamber at the bottom.

Sulphate making was carried on profitably until 1900, when, in consequence of an offer made by a large firm of chemical manufacturers to purchase concentrated ammoniacal liquor for a term of years, it was decided to alter and extend the plant so that this product could be made. The extensions were carried out in such a way as to leave intact the part of the plant required solely for sulphate making; so that in case the concentrating process did not turn out satisfactory, sulphate making could be recommenced without incurring further expense, and in a few hours' time. Fortunately, however, the newer process has answered so well that the idea of making sulphate again has never so far had to be considered.

Briefly, the process consists in condensing the ammoniacal vapours from the still, along with the sulphuretted hydrogen and carbonic acid, into a nearly saturated solution of sulphide and carbonate of ammonia, instead of treating them with sulphuric acid. The alterations made to enable this to be done are illustrated on the accompanying plan, from which it will be seen that the two ordinary straight pipes connecting the saturator with the still and the heater respectively were replaced with two T-pieces A and B; the connection with the saturator being blocked each way by the insertion of blank flanges. The two T-pieces were connected by two flanged bends C C; the result being that the ammonia and vapours leaving the still pass through the connections A C C B into the heater, following the course round the tubes containing the raw liquor formerly taken by the waste gases from the saturator, and heating the raw liquor in the same way that the waste gases did.

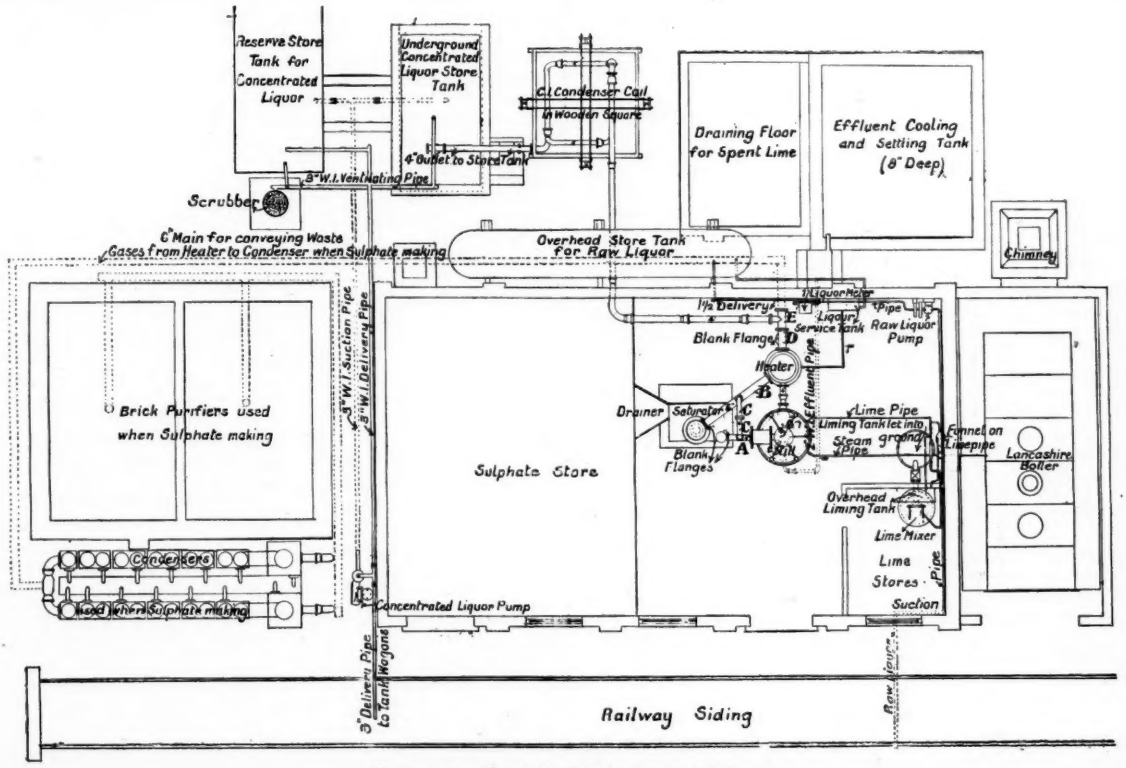
The next alteration was in the outlet from the heater. The waste gases from the saturator, before they entered the oxide purifiers, originally passed through an underground length of pipe to an old-fashioned vertical condenser that in days gone by had done duty as a coal-gas condenser; but an apparatus of this form was not suitable for condensing the ammoniacal vapours into a liquid. Accordingly, the bend leading from the heater towards this old condenser was taken out and replaced, as shown, with two T-pieces—the first one, D, joining up to the pipe leading to the old condenser, but being isolated from it by means of a blank flange; and the second one, E, connecting up to the inlet of a new condenser erected outside the building, and consisting of a coil of forty 4-inch cast-iron bends, 5 ft. 6 in. long, connected together with leaded and yarned joints into the form of a square about 8 feet high. The condenser is contained in an open-topped wooden tank full of water, 8 feet square by 8 feet high, of 3-inch best red deals, secured together with 1-inch bolts, 8 ft. 9 in. long; the joints being made with rushes, and the tank being prevented from bulging by four pieces of old railway metal arranged as vertical stays, one on each side. The bottom ends of the rails are fastened in the ground, and the tops held in position by light tie-rods. A small stream of water flows through the tank all the time the process is at work; the inlet being carried down to the bottom and the outlet being at the top.

The vapours from the outlet of the heater flow with a slight fall to the inlet of the condenser-coil, and pass through it in a downward direction; being gradually condensed into concentrated ammoniacal liquor, having a temperature of 90° to 100° Fahr. at the condenser-outlet. From the latter, the concentrated liquor gravitates into an underground storage-tank embedded in asphalt (the tank consisting of an old boiler 24 feet long by 6 ft. 6 in. diameter), and the liquor is pumped from this every few days through about 30 feet of 3-inch wrought-iron piping, by a 4-inch vertical tappet-action pump, into buyer's railway tank-waggons.

There is a second storage-tank fixed above ground for use in case of a shortage of tank-waggons; and the two are ventilated by 3-inch piping carried into the base of a small tower scrubber formed of an old 12 feet length of 24-inch pipe, containing a depth of about 7 feet of coke, down which water trickles. Above the coke are two layers of oxide of iron, each rather more than 1 foot in depth, preventing the sulphuretted hydrogen from the liquor in the storage-tanks from contaminating the atmosphere.

It will be seen from the foregoing that the saturator, condenser, and purifiers required when sulphate making have been left intact; and to revert to this process all that would be necessary would be to alter the positions of the three blank flanges.

The cost of the alterations and additions to the sulphate of



Burton-upon-Trent Gas-Works Ammonia Plant.

ammonia plant to enable concentrated ammoniacal liquor to be made, was as below:—

Cast-iron connections between still, saturator, heater, and condenser	£20
Condenser-coil, consisting of forty 4 inch cast-iron elbow bends, 5 ft. 6 in. by 12 in., jointed together	65
Wooden square to hold the condenser, 8 ft. by 8 ft. by 8 ft. inside, of 3-inch best red deals bolted together	40
Two old boilers, 24 ft. by 6 ft. 6 in. and 25 ft. by 8 ft. by 7 ft. respectively, for concentrated liquor store-tanks	63
Pump, 4 inches diameter 12-inch stroke, tappet action, for filling tank-waggons	19
Wrought-iron connections and cast-iron plug cocks, all 3-inch	24
Wages and sundries	149
Total	£380

In the writer's opinion (which is, however, founded on experience with only this one plant), the points to be attended to in the design of a concentrated liquor plant are the provision of removable hand-covers or blank flanges at all places where there is a possibility of a stoppage; having all pipes through which the concentrated liquor has to pass of heavy cast iron where practicable (reducing the use of wrought iron to a minimum on account of the corrosive action of the liquor); and arranging for all the pipes and fittings in connection with the store-tank being easily removable from the outside.

With regard to the working of the process, there is less labour attached to liquor concentrating than there is to sulphate making; and although the one man per shift required at the works under consideration for either process cannot be dispensed with, he attends to other duties while he is working the concentrating process, which he was not able to undertake when he was sulphate making. The repairs to the plant are also less costly with the newer process.

In addition to maintaining a regular supply of lime to the still, and keeping the effluent liquor free from ammonia, points that require attention at least every couple of hours by the man working the plant are the temperature and the strength of the concentrated liquor as it leaves the condenser and enters the store-tank. If the temperature gets much above 100° Fahr., the ammonia remains as a vapour, and is liable to cause trouble from back-pressure; while if it gets much below 90° Fahr., there is a risk of crystals of carbonate of ammonia forming in the condenser-outlet, and unless these are detected and dissolved by blowing steam through the pipes, they quickly set together in a caked mass and require cutting out with a hammer and chisel. The temperature is, of course, controlled by the rate at which the cooling water is allowed to flow through the condenser-tank. With regard to the strength of the concentrated liquor, this should not be allowed to exceed 19° Twaddel at the condenser-outlet, or there will be trouble from the formation of crystals as before; while if it gets below 13° or 14° Twaddel, a low percentage of ammonia is indicated, which is not satisfactory—at any rate, from the point of view of the party who pays carriage on the concentrated liquor from the gas-works.

Various methods of liming have been tried. When the plant was first put down in 1892, a steam-jet pump or injector was used intermittently to force milk of lime into the still, with the result that at one time too much lime was passing through and at other times not enough. After that, one of the smallest fly-wheel pumps obtainable was tried running continuously; but this did not answer, as the pump had to be worked so slowly that it frequently stopped and used to get clogged up with lime. The method now in use, which has answered satisfactorily for some years, is to lift the milk of lime with a steam-jet pump worked intermittently from the liming tank on the ground level to a small galvanized iron tank fixed 4 ft. 6 in. above the lime-chamber of the still. The milk of lime flows continuously from this small tank by gravitation through a funnel into the still. The break in the line of pipe at the funnel enables one to see that the lime is flowing properly, and also acts as a relief-valve in case of any temporary stoppage in or beyond the still.

A positive type of liquor meter has recently been added to the plant. It is connected to the delivery-pipe of the pump supplying crude liquor, and measures the volume dealt with. The record of this, and of the quantity of concentrated liquor made day by day, forms a useful check upon the working of the plant. The writer is indebted to Mr. Fletcher W. Stevenson, of Coventry, for this suggestion.

Coming, finally, to the financial results obtained from the plant (which, after all, are the only justification for its existence), the following figures show what the net revenue from ammonia products, in pence per 1000 cubic feet of gas sold, has been at Burton-upon-Trent during the last few years, and how these results compare with those of other gas undertakings in England and Wales.

Financial Year.	Net Revenue from Ammonia Products in Pence per 1000 Cubic Feet of Gas sold at Burton-upon-Trent.	Position in Order of Merit when Compared with other Undertakings in England and Wales.	Number of Undertakings in England and Wales dealt with in the "Gas World" Analyses of Accounts.
1903-4	2·45d.	18th	95
1904-5	2·60d.	12th	97
1905-6	2·80d.	6th	98
1906-7	2·31d.	13th	103

Discussion.

Mr. J. Darrah (Adderley Street) said that he would like to ask Mr. Ramsden a few questions; but, first of all, he would remark, with reference to the comparison shown of revenue from ammonia products per 1000 cubic feet, that in his opinion such a comparison was faulty, for this reason: A works might produce one year a quantity of ammonia equal to the last year's production, and obtain an equal revenue; but if the make per ton of coal showed an improvement, and a similar quantity of coal were used, the revenue from ammonia products would show a decrease. The net revenue per ton of coal carbonized would be a much more satisfactory comparison. Did Mr. Ramsden have any trouble with tarry compounds or phenols in the concentrated liquor? What was the average amount of carbonic acid and sulphuretted hydrogen per gallon of treated liquor? At what pressure did he admit steam to the still; and how much lime per 1000 gallons did he use?

Mr. T. Berridge (Leamington) congratulated Mr. Ramsden on the remarkably good results he secured at Burton-upon-Trent. A return of 2·8d. for ammonia products per 1000 feet of gas sold was very good indeed; and he deserved great credit for it. He would like to ask what was done with the spent liquor. A good many of them would be quite willing to make concentrated ammonia or sulphate of ammonia if they knew of some method of getting rid of their spent liquor. Mr. Ramsden was fortunate in one thing, as, his being a corporation works, they probably allowed him to turn what he liked into the sewer. But if he were with a company, he would find himself more strictly dealt with on this point. Then what precaution was taken with the open purifiers? It might be quite desirable to have open purifiers; but they all knew that many accidents to people had occurred in gas-works through gas passing from the foul purifiers. He would therefore be glad to hear how he was able to regulate the purifiers. As they were all aware, sulphate of ammonia had gone down in price during the last two years. Were Mr. Ramsden's better results coming from an increased make of ammonia? Did the price received under his contract vary with that of sulphate of ammonia, or was it a fixed price?

Mr. A. O. Jones (West Bromwich) remarked that it would be interesting if Mr. Ramsden gave some comparison between the price he used to obtain when manufacturing sulphate, and that he secured now when making concentrated liquor. After all said and done, it depended upon whether he got a better price now for his ammonia than he did for his sulphate. He would be glad to have some information in this respect.

Mr. T. Brooks (Birmingham) asked how many gallons of 10 oz. liquor per ton of coal they obtained at Burton-upon-Trent. Of course, this depended greatly upon the coals used; and it might vary from about 26 gallons to (say) 40 gallons.

Mr. F. J. Ward (Knowle) said he had had a little experience with a plant for concentrated liquor, but not a continuous one, like that at Burton-upon-Trent. His was an intermittent plant—a coffee-pot kind of still, in which there was put a certain charge, which was then worked completely off. He could bear out Mr. Ramsden's statement that it was necessary to be very careful with regard to the formation of crystals. At the works where he (the speaker) had been, they had had this trouble several times; and after he left the place, it occurred again, with the result that the still went through the building. He would like to ask Mr. Ramsden the reason why it was necessary to concentrate the liquor. He said it should not be allowed to exceed 19° Twaddel, or get below 13° or 14°. Was it not possible to work it up (say) in a Livesey washer to these strengths, and thus save all this trouble? He took it that the whole secret of the thing was to avoid carrying water.

Mr. C. G. Langford (Coventry) remarked that they had a plant at Coventry for concentrating liquor; and Mr. F. W. Stevenson had quite intended to be present to take part in the discussion on the paper. The plant was working very smoothly and satisfactorily. At present they were making concentrated liquor which was converted to 12 per cent. ammonia—about 62 tons a week, equivalent to (say) 30 tons of sulphate. He quite agreed as to the necessity for keeping a close watch on the temperature at the condensers. They found, however, they could work to a temperature of 67° to 70° quite comfortably. Looking at Mr. Ramsden's plant, he was rather surprised to find his lime arrangements were satisfactory. He pumped the lime to an overhead tank in which there was no agitator. Did he not get thick lime into his delivery-pipe? He would have thought that there would have been at one time thick lime, and at another a thin watery solution. Did Mr. Ramsden convert his concentrated liquor to any standard ammonia? Could he say what was the yield of concentrated liquor from crude liquor?

Mr. J. H. Willoughby (Leamington) said that Mr. Ramsden's paper would be very useful to managers of works which were situated at some distance from the persons who bought their liquor. It was very often in the depth of the winter a serious trouble to know what to do when their storage wells were full, owing perhaps, if they depended on a canal, to the means of transit being frozen; and Mr. Ramsden amply met this difficulty. With regard to the question whether they could get concentrated liquor in a Livesey washer, he hardly thought it was possible. His own experience was that if they got 10° (20 oz.) liquor, it was about as concentrated as they were likely to obtain it. Besides, they needed a certain amount of weak liquor for purification. He proposed a hearty vote of thanks to Mr. Ramsden for his paper, which was on a subject that had not previously been laid before the Association.

Mr. H. Burgess (Derby) said it seemed strange Mr. Ramsden

should get such good results by going only half way with the process, and that it should not be better to go in for sulphate making when he had gone so far. He had much pleasure in seconding the vote.

Mr. RAMSDEN, in reply, thanked the members for their vote, and remarked that he did not expect a very long discussion on the paper, because it was hardly a question that could be dealt with off-hand. He quite agreed with Mr. Darrah that the net revenue from ammonia products per 1000 cubic feet of gas sold was not an altogether ideal method of comparing one works with another; but when writing the paper he looked round for some means of showing that they were getting good results, and this appeared to be the only column of the "Gas World Analyses" that could be used for a comparison. Unfortunately, there was not a column given for revenue from residuals per ton of coal carbonized. They did not experience any difficulty from tarry compounds in the liquor. If their overhead store-tank got low of liquor, they had a little tar down in the still, which set in the form of pitch; and always on top of the concentrated liquor in the store-tank there were a few inches of tarry oil. By pumping down fairly to the bottom each time, they never experienced any difficulty from this. He was afraid he could not give the quantities of carbonic acid and sulphuretted hydrogen present in the concentrated liquor, as they had never found any necessity for estimating them. The sulphuretted hydrogen and other gases that were given off by the liquor passed from the store-tank by a ventilating pipe into the tower scrubber. The steam was admitted to the still at 11 lbs. per square inch pressure. He could not give the quantity of lime used per 1000 gallons of raw liquor; but he might remark that during the last few years they had paid an average of about £20 per annum for lime, which they might take it represented approximately 40 tons of lime. He was obliged to Mr. Berridge for the kind remarks he had made regarding the paper. The gas-works were situated at the far end of the town, so that the spent liquor soon reached the pumping-station. They sent the liquor through the effluent cooling and settling tank, 8 inches deep, and ran an ample supply of water in at the same time, thus bringing it down to a moderate temperature, and sent it into the sewer. There was simply the waste liquor from the still. The oxide purifiers were only being used when they were making sulphate. Now, all the oxide purifying they had was two layers of oxide at the top of the tower scrubber; and these were emptied out every couple of years. They had experienced no trouble; and the method answered quite satisfactorily. The arrangements for the sale of the liquor were on a sliding-scale. When sulphate was £12 per ton, they got so much per unit of ammonia per ton of liquor—in the same manner as they sold spent oxide by the percentage of sulphur contained in it. As to Mr. Jones's question, the average net revenue from ammonia products during the seven years March, 1895 to 1901, when they were selling sulphate of ammonia, was 1·52d. per 1000 cubic feet of gas sold. During the five years March, 1903 to 1907, when they were selling concentrated liquor, the figure was 2·5d. In these same periods, the average market prices per ton of sulphate of ammonia, as given by Messrs. Bradbury and Hirsch in their reports, were £10 1s. 10d. and £12 4s. 1d. respectively. Thus, while the price of sulphate had gone up some 21 per cent., their net revenue from ammonia products had gone up about 64 per cent. In reply to Mr. Brooks, he was afraid he could not give the quantity of 10-oz. liquor per ton of coal. They did not get up to 10 ozs. The liquor in their store-tank was generally about 3° Twaddel. The yield of concentrated liquor per ton of coal represented 25·4 lbs. of 24 per cent. sulphate. When they started the plant, they found the trouble from crystallizing serious, until they got into the way of admitting steam as soon as it was required to dissolve the crystals. They had no standard of working such as was the case at the Coventry Gas-Works—12 per cent. ammonia; but the averages during the past few years had been: Year ending March, 1903, 12·8 per cent. ammonia; 1904, 14·6 per cent.; 1905, 14·1 per cent.; 1906, 12·5 per cent.; 1907, 12·5 per cent. So that they kept pretty much on the same lines as Coventry. Referring to the lime arrangement, it probably would be better if there were a small agitator in the tank from which the liquor gravitated to the still; but it was only a small cistern, about 2 feet by 2 feet, which emptied itself in little more than an hour. Thus there was no very great chance of settling; and what settlement there was, they got into the still pretty regularly. With regard to the yield of concentrated liquor from crude liquor, they had not had their liquor meter in use more than a few months, so that he could not go back very far. But during December, when the plant was shut down for a week or two as the still required cleaning, they made 49 tons 10 cwt. of concentrated liquor, 12·3 per cent. ammonia, equivalent to about 25 tons of sulphate of ammonia, from 107,000 gallons of crude liquor of about 3° Twaddel, which was equal to 4280 gallons of crude liquor per ton of sulphate. During January, they made 87 tons 12 cwt. of concentrated liquor, 12·2 per cent. ammonia, equivalent to 45 tons of sulphate; and they used 176,000 gallons of crude liquor, of about the same strength, which was equal to 3910 gallons of crude liquor per ton of sulphate. With regard to the suggestion to work the liquor up without concentration, they could not do this at Burton-upon-Trent. They had not a Livesey washer; and unfortunately they were very cramped for room. Formerly, they had only one washer—a Kirkham; but when additions were made in 1902, a different form of washer was put down. This, however, had to follow the Kirkham, and it was quite out of the question to attempt to get strong liquor in the last washer. In reply to Mr. Burgess, he could only repeat that they were paid on a sliding-scale based on the market price of sulphate; and they got a higher figure than they could for sulphate, whatever might be the market price of sulphate.

THE WORKING OF A CARBURETTED WATER-GAS PLANT.

By HAROLD E. TEMPLE, of the Nechells Gas-Works, Birmingham.

[A Paper read before the Midland Junior Gas Engineering Association, at Birmingham, on Feb. 8.]

I do not consider it necessary to describe in detail the arrangement of a carburetted water-gas plant; the only difference in the two types generally adopted being: (1) The separate carburettor and superheater; and (2) the combined or superimposed superheater. In the first, the oil is injected in the direction of the flow of the gas; whereas in the latter, it is admitted in the opposite direction. Advocates of the former system hold that they have greater facilities for controlling the temperature of the respective chambers, as there is no tendency for the heat to climb from the carburettor to the superheater, and that this advantage compensates for the increased floor-space required. In practice, however, no difficulty is experienced in maintaining constant and suitable temperatures, when working with the combined type of carburettor and superheater, by proper regulation of the secondary air-valves; and it is only when a plant has to stand-by for repairs for some hours that any tendency is noticed for the temperatures to become reversed.

The points to be aimed at, when working a plant, are:

(1) Maximum production of gas per set, with a minimum production of carbonic acid.
(2) Maximum photogenic efficiency from the oil used, with a minimum expenditure of materials and labour for renewals of checker-work, and the production of a tar which will not give trouble in the separators.

In order to secure the conditions necessary for the fulfilment of the first requirement, sufficient heat must be stored in the generator, in the shortest possible time, to enable the reaction $C+H_2O=CO+H_2$ to take place, while getting the greatest possible velocity of steam through the bed of fuel, with a minimum formation of carbonic acid. In practice, taking an average for 24 hours' working, the economical minimum will lie between 3 and 3·5 per cent.; any reduction on this figure being at the expense of the volume of water gas made. This applies only to cases where the steam admitted under the generator-bars is regulated by a valve having a definite fixed opening throughout the duration of the run, and not where the amount of steam is automatically governed by the resistance of the fuel-bed and the quantity of gas being made. Where the latter system is in use, it is possible to work with only 1 per cent. of carbonic acid, without the make being reduced; any increase in the formation of carbonic acid being immediately shown by the differential gauges of the steam and gas. I do not know of any plants working under these conditions in this country; but I believe the system, which is due to Professor H. Strache, has been applied with success to a Dellwik plant in Vienna, a detailed description of which can be found in the "JOURNAL OF GAS LIGHTING" for Sept. 24, 1907.

The best depth of fuel has been found in practice to be about 6 feet, except just before clinkering, when it is advantageous to lower to about 3 ft. 6 in, in order to facilitate "barring down" or the removal of side clinker from the walls of the generator. Here I would remark that the general practice of makers of water-gas plants is to provide side clinkering-doors which are not large enough; and valuable time is lost breaking up pieces of clinker before they can be removed from the machine. Much remains to be done to improve this, the worst feature of a scientific process designed for the saving of labour. The time wasted and the manual labour expended in clinkering reduces the ideal efficiency and adds materially to the cost.

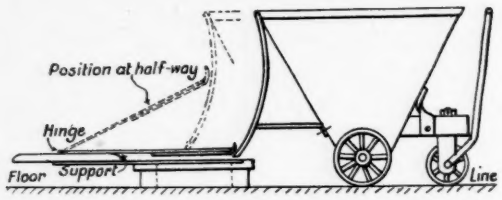
From experiments I have made on a small scale, I have come to the conclusion that it would be possible to design a generator without bars, having a closed sloping hearth. The steam would be admitted at a point above the ordinary clinkering zone and above the blast-inlet; the temperature of the bottom of the fire being maintained sufficiently high to keep the clinker in a molten condition. It would then only need tapping from time to time, and might be cast into blocks to serve some useful purpose.

With large plants of 1,000,000 cubic feet daily capacity, working with coke containing 7 per cent. of ash, clinkering once in twelve hours is the most economical mode of working; and even under the worst conditions this operation should never occupy more than 60 minutes. Before starting up again, the gas-maker should turn steam under the bars and inspect the condition of the steam-jets, as these are liable to become blocked from time to time by small pieces of scale from the inside of the pipes; and uneven distribution of steam is responsible for many eccentricities in the working of generators.

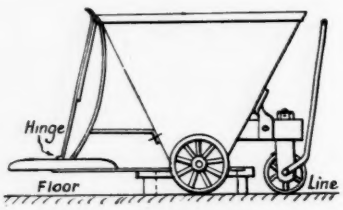
Trouble is occasionally caused by leaky clinkering-doors; but

this can be entirely obviated by cutting a groove round the face of the lid and inserting asbestos cord of larger diameter than the groove. Advantage can be taken of clinkering time to carefully examine the blast-valves; removing the covers provided for the purpose, and testing the face of the valve with soap solution. Spare blast-valves should always be kept in stock; and no valve which has been found to leak should be allowed to remain in position. Blast-mains should always be provided with safety ends, in addition to the usual flap-valves. These may be made of thin wood or canvas protected by wire grating. In the event of an explosion, the fans or mains will not be damaged.

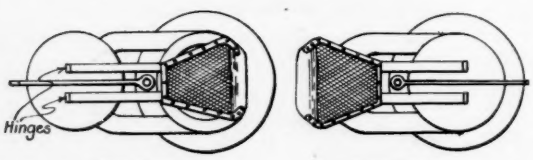
I would here call your attention to a safety-guard which has been designed at the Nechells works, to prevent accidents while the firing lid of the generator is open. When the lid is opened, the guard swings into its place, and is caused to lift up by a curved projection fixed to the coke-buggy.



Door Open to Receive Coke.



Generator Receiving Coke.



Door Open. Door Shut.

After clinkering, the fires should be built up gradually; longer periods of blowing being allowed until the normal temperature and depth have been attained. Theoretically, it would be an advantage to add the fuel in small quantities at frequent intervals, in order that the conditions existing in the fire should remain as constant as possible, though in practice, with other conditions remaining constant, this has not been found to reduce the percentage of carbonic acid, or to perceptibly increase the make. It would, however, save labour and wear and tear on the firing-lids, if a "shot pocket" measuring-chamber were fixed on the lid, and charged by means of a shoot from an overhead hopper; and the saving would be obviously greater in installations where more than one machine is kept constantly at work. The overhead hopper for coke storage has been adopted at Leicester and other works; but the generator lids are opened and closed each time fuel is added, thereby losing a little time on each occasion.

The effect of alternating the flow of gases through the generator by means of water-cooled up-and-down-run valves, is not, in my experience, compensated for by the increased cost of attention and repairs which these valves necessitate on large sets; and for this reason their use has been abandoned at more than one installation, without any falling off in the efficiency of the plant, and at a considerable reduction in cost of renewals and repairs.

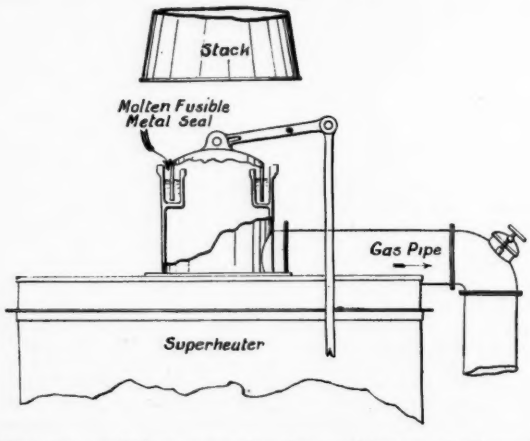
Great difference of opinion exists as to which is the most economical ratio of the time expended while blowing and running; but this will vary with the proportions and design of individual plants, and with the class of fuel being used. In my experience on a plant of six 1,000,000 cubic feet machines, using a mixture of coke from several coals, 3 minutes blow and 7 minutes run has been adopted as giving the best all-round results. Suitable means should be provided to ensure the working instructions being adhered to; and for this purpose the water-gas cycle recorder made by Messrs. Thorp and Marsh is an excellent check on the manipulation of all valves. When no such check is kept, an over-zealous operator, hoping to surpass the efforts of his predecessor and successor, may rob his blow of a minute and transfer it to the run, with dire effect on the results.

A most important factor in the oil efficiency of a plant is the distribution and condition of the checker-bricks in the carburettor and superheater. Low illuminating power is frequently traced to patchy heats, due to irregular distribution of the blast, which has a tendency to issue in greater volume from the ports directly opposite to the inlet. Generally it is a good plan to space the checker-work more closely round the shell of the machine, gradually increasing the space between the bricks from 1¼ inches to 2½ inches apart, from the side to the centre. Sealing courses can be employed with advantage, about 18 inches apart, in cases where the blast has a tendency to heat the outside bricks and to leave the centre of the machine dull. The top courses of brick-work in the carburettor should be frequently changed, as it is at this point that the polymerization and dissociation of oil vapours takes place; and if these bricks are allowed to carbon-up, or to become glazed over, the result will be a reduction of illuminating power and great waste of oil. The checker-work of the superheater should be burned free from carbon as soon as any accumulation is noticed; the best method of doing this being to take off a cover on the blast-inlet to the carburettor, when the natural draught through the machine is sufficient to accomplish all that is required.

The outlet gas-main and the washer should be thoroughly cleaned as soon as the reduction in area of the main causes an increase in the back-pressure; and after such cleaning the overflow from the washer should be tested, to see that it is clear and free from pieces of carbon. A book should be kept in which all inspections of valves, injectors, meters, and oil-heaters, cleaning of washer and take-off main, and renewals of checker-work, should be entered. In this way, a close watch may be kept upon the working of each machine.

A type of oil-injector should be used which can be removed quickly for inspection and cleaning; a device such as a divided screw being a convenient method of securing it to the sleeve. An injector that gives a "swirl" to the atomized oil is found to furnish good results, as a better mixture with the hot gases takes place. The oil should be admitted to the injector at as high a pressure as possible; and for this reason it is advisable to work with the oil-valves fully open on the oil-meter, and to regulate the quantity of oil by the injector-valve. The oil should not be admitted at constant rate during the run. The greater portion should be admitted in the first two minutes, and gradually diminished until the full amount has been registered. This should be about 1½ to 2 minutes before the end of the run. Careful check should always be kept on the accuracy of the oil-meters; and the readings should be compared at frequent intervals with the quantity used as ascertained from the reduction in stock. When any discrepancy is noticed, the oil-meters can be removed for testing and adjustment. For this purpose, a carefully gauged tank, containing about 200 gallons, should be fixed in a convenient position at a height sufficient to give the necessary head for properly working the meter.

A much-debated point in carburetted water-gas practice is, At what temperature should the checker-bricks in the carburettor and superheater be maintained, in order to furnish the highest possible permanent illuminating power with a given quantity of oil? This will depend not upon the specific gravity or boiling-point of the oil used, but upon the percentage of hydrocarbons of different series present. The more homogeneous the composition of an oil, the easier is it to find a definite temperature, which will produce the maximum amount of saturated hydrocarbons. An oil containing representatives of several series of hydrocarbons cannot be properly cracked at any definite temperature, but may produce light oils and lamp-black at the same time, from the splitting up of different series. A fairly reliable indication that the oil is being employed with economy is the impingement of a small jet of unignited gas taken from the stand-pipe upon a piece of paper, which should be slightly charred, with a small deposit of carbon, but should not be greasy or tarry.



That the conditions governing the cracking-up of oil are but imperfectly understood, is instanced by the case of an oil which yielded its highest value when large quantities of light oil were being produced. When the temperatures of the machines were raised in order to prevent the formation of these oils, the illuminating power was considerably reduced. This can be explained by the supposition that, at the temperatures prevailing during the formation of the light oils, a sufficient quantity of gaseous hydrocarbons of a high photogenic value were formed, which were more than enough to compensate for the small percentage of oil cracked, and accounted for the high make of light tar.

The stack-valve is frequently a source of trouble, owing to leakage caused by tar deposited on the face of the valve becoming hardened, and thereby preventing it from closing properly on its seat. The usual method of overcoming this is to grease the face of the valve with tallow and graphite; but an arrangement has lately been described in the Technical Press, whereby a grinding motion can be imparted to the valve when on its seat, freeing it from scale and keeping a tight joint. Another method by which the same end might be achieved would be by sealing the valve in a lute of molten fusible metal, which would always be maintained at a temperature much above its melting-point. A sketch of the arrangement referred to is given.

Great loss of heat takes place at the stack during the blow which might with advantage be utilized, especially when there are several machines at work. By jacketing and strengthening the stacks, and fitting them with cross tubes, they could be connected together and used for heating the boiler feed.

A carburetted water-gas installation should be worked as an enriching plant; and the injectors employed should be suitable to the desired illuminating power, which should not be required to vary more than 2 candles. The efficiency of an injector will vary with the amount of oil it has to deal with. One which would give 8 candles per gallon per 1000 cubic feet at 18-candle power, might fall as low as 6·5 candles per gallon at 24-candle power; while the reverse might be the case with another injector.

A further economy in labour might be effected by devising a mechanical gas-maker which would manipulate the working valves of the plant; the only attention that would then be necessary being the adjustment of the secondary blast to suit the temperature requirements. But such an idea is altogether impracticable. Revolving shafts, fitted with cams and wheels, the speed to be controlled by clockwork mechanism, with suitable provision for regulating steam and oil, could be arranged, and do not present any insuperable mechanical difficulties.

Discussion.

Mr. A. O. Jones (West Bromwich) said the paper was one that should appeal most to those who had practical experience with carburetted water-gas plant; but he was rather interested in it himself, more from an academical point of view. One thing that struck him was that Mr. Temple had found by experiment that, by having the bottom of the generator very hot, he would be able to keep the clinker in a molten condition, which might be moved by tapping periodically. This seemed a very good idea; and if the experiments were continued, they would be glad to hear the result. Clinkering the generators was a great deal of trouble. Of course, a debatable point about carburetted water gas was whether it was the best method of enriching gas by the vaporization of oil. The fact that the checker-work in the superheater got carboned-up, and the carbon had to be removed, seemed to point to the heats not being correct at times. It appeared to be rather against theoretical perfection to have a vessel heated to a high temperature to start with, and pass gas through it and oil vapour in a constant stream, and for the temperature of the vessel to be continually decreased. That was to say, at the beginning of the run the temperature was very high, but at the end it was comparatively cool; so that at the beginning of the run the oil must be over-cracked, or at the end under-cracked. It seemed to him the better plan would be to vaporize the oil in a vessel kept at the same temperature all the time. Mr. Temple mentioned that it was a debatable point as to what temperature the checker-bricks should be kept at. It seemed to be impossible to keep them at a proper temperature at all in a carburetted water-gas plant. He should have liked to have had some figures with regard to manufacturing results, because whether it would pay to adopt it was what they wanted to know about carburetted water-gas plant.

Mr. E. J. Wellens (Hebden Bridge) said he did not wish to criticize the paper in any shape or form. He had not had any great experience of carburetted water gas; the plant of which he had charge was only small—200,000 cubic feet a day. Where he differed from the author was where he recommended the plant to be used more as an enricher. He unfortunately had to work his plant according to the demand for gas. One day they had to work it at its maximum; and the next day perhaps they might have to shut it off. Some days the consumers got as much as 40 or 50 per cent. of carburetted water gas, though at other times they had not any. This generally happened at the week-ends, and was owing to the insufficient storage. A good recommendation of the author was the safety-guard to prevent accidents at the top of the generator; but he thought this would particularly apply to large plants. He noticed there was nothing said about results; and he personally would have liked to have seen figures appertaining to carburetted water-gas production.

Mr. J. Taylor (Hollinwood) said the paper seemed to him an eminently practical one; and there were several remarks in it that particularly struck him. With reference to the clinkering, there was no doubt this was a very nasty business with carburetted water-gas plants; and it constituted a drawback. But the time mentioned by Mr. Temple was excessive. He referred to 60 minutes for this operation as a maximum. Probably the percentage of ash in his (the speaker's) coke varied from 6 to 9; and they generally got through their clinkering in 15 minutes, with a 500,000 cubic feet plant. The guard over the top of the generator was a new device to him; and he should say it was a most suitable preventative of accidents. Then as to the varying characteristics of the hydrocarbons in the oil being productive of a good deal of trouble in the heats required for cracking the oil, he could thoroughly agree with this statement. He was experiencing just the same trouble at the present time.

Mr. F. J. Bywater (Saltley) thought the paper was particularly welcome, as it was of a practical character. The absence of figures was somewhat regrettable; but they must all recognize the difficulties of presenting figures in connection with a paper of this description. He would have been greatly pleased to have seen Mr. Temple support his statements as regarded the separate and combined carburettor and superheater. If he had given them some results in candles per gallon of oil, they would have been able to make comparisons between the two methods. In the paper, reference was made to difficulties in the matter of temperature; and he (the speaker) thought that these were less in the plants where the superheater was separate. There was no doubt a difficulty in getting proper temperatures for cracking the oil; and, as far as he could see, the more separate the superheater was kept, the more likely one was to be able to control the cracking of the oil. If Mr. Temple meant to keep the clinker molten—as he assumed was the case—how did he intend to do it? He would have to adopt some kind of jacketting, or the clinker would set, because of the cool air going through it. And he did not see how he would keep the clinker from rising over the steam-nozzles. The difficulties that the author called attention to with down-runs, and the recommendations he made with reference to continuous up-runs had, he thought, been somewhat influenced by his remarks that the fittings of the down-runs had mainly given trouble. He thought it was pretty generally understood that the fittings of water-gas plants were productive of a tremendous amount of trouble; and therefore it was most necessary when contracts were being made that the quality of the fittings the firm proposed to furnish should be most carefully looked into, and also when they were being supplied. Reference was made in the paper to a difficulty with regard to the checker-bricks; and this was a well-known source of trouble in connection with water-gas plants, to the man who made the bricks, and also to the user. As far as he had had experience of this kind of work, he found it better to have a mild brick. It should be free from free silica and iron, and should consist of silicate of alumina and alumina. The small checker-bricks were often made of ordinary offal clay; and unless the maker of them was accustomed to the difficulty that a gas engineer had to contend with, he usually gave a lot of trouble by lack of foresight. If gas men would pay a little more attention to the mixture of which checker-bricks were made, they would find themselves well repaid. The idea of the stack-valve was rather interesting; but he did not quite see that it was practical. For instance, he would like to know what metal Mr. Temple suggested should be used in the seal for the stack-valve, and also how he proposed to keep it in a molten condition when the plant was shut down. It would be rather awkward to find, when one wanted to re-start the plant, that the metal had set.

Mr. J. Darrah (Adderley Street) said there were many good suggestions in the paper; but he could not quite agree that the secondary blast-valves of the combined type of carburetted water-gas plant were of much use for regulating the temperatures of the carburettor and superheater—especially the blast of the latter. Better control could be obtained with a separate carburettor and superheater. As to the closed sloping hearth, Mr. Temple omitted to say how the clinker would always be kept in a molten condition. Once it was free from carbon, he did not think it could be kept molten by simply blowing air through it. He did not believe in working to set rules. For instance, the blast and steam should be altered to suit the conditions that obtained just before clinkering, just after clinkering, and just after charging. A freshly clinkered fire at a good temperature obviously could stand a lot more steam than one lacking these advantages. The impingement of a jet of the gas, through a pet-cock on the stand-pipe, on a piece of paper, was a very useful control; but Mr. Temple should have mentioned at what period of the run such a test should be made. Personally, he considered that the slightest trace of tar during the third minute of the run was a good general rule. The bricks for the checker-work should also not contain much oxide of iron, as this was liable to be reduced to carbon monoxide, with formation of carbon dioxide. Referring to Mr. Temple's remarks about the efficiency of injectors, he would be glad to have these made a little clearer. Given proper attention, the injector could hardly be solely blamed for such a variation, having regard to the collateral ones produced by alterations of temperature and steam. It was common experience that the more oil used, the less was the efficiency; but the injector was not to blame for this. What, in Mr. Temple's opinion, was the cost per candle per 1000 cubic feet of carburetted water gas as an enricher?

Mr. C. C. Barber (Birmingham) also agreed that the paper contained one or two very good suggestions. It was very important to level the fuel-bed in the generator after firing-up. In his opinion, the majority of the carbonic acid was made just after clinkering; and if the fire was level and extra time was given for the blast, this was overcome to a great extent. He did not think it was necessary to "bar down" each time they clinkered; every other time would be quite sufficient. With regard to keeping the clinker in a molten condition, how was the heat going to be maintained in the clinker? He took it, it would be by some external means. He quite agreed with the remarks as to water-cooled

up-and-down run valves. They were a source of great trouble and expense; and the extra gas and better working condition of the plant would not compensate for them. When recommending 3 minutes blow and 7 minutes run, the author should have stated the blast pressure and steam pressure, as a great deal depended on this. The spacing of the checker-work was a very important item, as if it were not spaced properly it was almost impossible to get good results. As to Mr. Darrah's remarks about injectors, he thought that if injectors were made to suit the quantity of oil used per run, as good an efficiency could be got with a high quantity of oil as with a low quantity.

Mr. C. H. Edmonds (Birmingham) asked whether Mr. Temple had ever tried shutting off a portion of his steam as the run neared its close, to reduce the percentage of carbonic acid. In connection with the question of carbonic acid, he had obtained some rather interesting figures. It was found that directly after coking-up, the average amount of carbonic acid per run was less than it was (say) after three or four runs. When the injector was working badly, he found it could often be located by lighting the gas issuing from the sight-cock below the injectors. If they got gas of high illuminating power, it could generally be assumed that there was something wrong with the injector. Mr. Temple said a water-gas plant should be used as an enricher, and immediately went on to state that the illuminating power should never be required to vary more than 2 candles. It was often required to make a much heavier variation than this in the quality of the water gas one was making; and in connection with this question of enriching, it was interesting to note the comparative values one could get from a gallon of oil when used in a water-gas plant and the same oil if used in making oil gas. From figures he had worked out, he found that, from a gallon of oil such as Russian Solar distillate, they could get about 2½ times as much candle power in a water-gas plant as in an oil plant. This showed what an enormous advantage there was when using oil in a water-gas plant; and it also led one to inquire as to whether there was not a still greater efficiency in the oil which could be got out of it if only the right conditions for cracking it were located. One other point that struck him was the amount of fuel they used in making their water gas. With a generator under good conditions, they might use 30 lbs. of coke per 1000 cubic feet, which worked out at about 27 lbs. of carbon. The reaction $C + H_2O = CO + H_2$ would take about 12 lbs. of carbon to be carried out, leaving 15 lbs. of carbon to go to raising the temperature and maintaining it. The actual amount of carbon needed for raising the temperature was 0·86 lb. for each pound of carbon used in the reaction; so that on the basis of 12 lbs. of carbon used in the reaction, it was necessary to use altogether for heating 10·3 lbs. of carbon, which made a loss of about 4·7 lbs. of carbon per 1000 cubic feet of water gas. This was a loss altogether of about 20 per cent. That was to say, if they could get down to ideal conditions, they ought to produce another 20 per cent. of gas from the fuel that was actually used.

Mr. Jones said Mr. Edmonds had raised a point with regard to vaporizing oil. He thought he would find that an oil similar to that used in a carburetted water-gas plant, if distilled in a Peebles oil-gas retort would give an enrichment of about 8 candles per gallon, which he believed was as a rule much higher than was obtained from a carburetted water-gas plant.

The President (Mr. W. E. Caton, of Derby) proposed a hearty vote of thanks to Mr. Temple for his paper, which, he remarked, had led to a good discussion.

The Hon. Secretary (Mr. J. Hewett), in seconding, said it was a matter of regret that Mr. Temple's chief, Mr. W. Chaney, was unable to be with them that afternoon. He had, however, sent a letter in which he said one point appealed to his mind as debateable—the cost of the maintenance of the water-cooled valve, compared with the effect and economy of altering the flow of gases through the generator. Unquestionable economy, he added, to his thinking was effected by the "up-and-down run" system; but the want of an efficient water-cooled valve was the delaying influence. Another point, he said, was the cracking of the oil to get the largest amount of tar with the most efficient oil value.

Mr. Temple, after acknowledging the vote of thanks, proceeded to reply to the different speakers. As to the lack of figures in the paper, he had purposely omitted these, inasmuch as fuel efficiency and oil efficiency were governed not only by the working of the plant, but by local conditions. There were individual characteristics met with in every plant. Six machines might be built to one drawing, all of which were supposed to be identical in every respect, and each would have its individual factor likely to give different results. There was also the quality of the oil and the quality of the fuel to consider; and therefore he thought it would not add at all to the value of the paper if he included figures. With regard to candles obtained per gallon, Mr. Jones said that 8 candles per gallon used, which was secured in a Peebles oil-gas retort, was much higher than he had found in practice with water-gas plants; but with an American oil of a gravity of ·855 to ·870, he (the speaker) did not think that 8 candles per gallon was at all unusual, while 7½ candles per gallon was an ordinary every-day working. As to the clinkering of the generator, he might say that the small experimental furnace to which he had referred was built for the purpose of dealing with retort-house ashes—practically refuse, containing a very high percentage of small pieces of clinker. He was trying to make a low quality producer gas to burn off lime; and in the generator he was able to produce a clinker which became quite fluid. He had no difficulty in running it off from time to time. The blast inlet both for steam and air was protected by a ledge; and the clinker formed on these ledges. From these results, he thought it would not be at all impossible to apply the idea to a water-gas generator, although he admitted they would have to alter the dimensions considerably. They would want a far deeper fuel-bed. As to the time spent in clinkering, one member mentioned 15 minutes. He did not know whether he meant that clinkering was only carried out twice a day—he did not say how many men were employed. Then, again, if it were a large setting, and there were division walls, this would have a very great effect, as clinker had a tendency to cling to the walls. He did not mean to say that "barring-down" should be resorted to each clinkering, or even every other clinkering. In some forms of machine, it was really only necessary to bar-down once in a few months. What he meant was that, when it was necessary to bar-down, then it was best to run down the depth of the fuel simply to facilitate the operation. In regard to the efficiency of up-and-down run valves, Mr. Barber had touched on a point that he (the speaker) had intended to explain more clearly. He did not mean to say that an up-and-down run did not increase the efficiency, but simply that with valves for very big sets, the difficulty in making castings which would stand the variations in temperature, &c., were such that a successful one had not yet been produced; and therefore he thought it was better to be without them. He believed it was decided that they were not worth the trouble. As to the composition of the fusible metal for sealing the stack-valve, the metal he had in mind was one on a bismuth basis, which could be kept molten at a temperature of 150° Fahr. There was no difficulty at all in maintaining this temperature; but if there were, a small ring of bunsen burners, or the jet that was used for lighting the stack gases, would answer the same purpose. He had not made the whole arrangement clear in the sketch. Of course, it would be necessary for the valve, when opening, to swing round. He had not tried one of the valves yet; but he hoped to do so before long. He quite agreed with Mr. Darrah about the conditions of the fire; but he did not think that fixed rules should not be laid down. It was a mistake to give water-gas operators too much latitude. They should have definite instructions with regard to the times of the blows and runs, &c. Mr. Edmonds asked if he had tried the effect of varying the steam throughout the run. He had done so. He had worked allowing the highest velocity of steam during the first two minutes, and then tailing off to practically zero at the end of the run. This did reduce the percentage of carbonic acid; but, as he had pointed out, he thought that was exactly the arrangement described in the "Journal of Gas Lighting" as having been applied to a Dellwik plant in Vienna. This was the ideal condition, he thought, with regard to the regulation of steam through the fire. The remarks with regard to figures would apply to Mr. Darrah's question as to the cost of enrichment by water gas. He could, however, say that the cost in Birmingham was about 0·6d. per candle per 1000 cubic feet.

The Cleanliness of Street-Lanterns.

A little compliment is paid to gas companies in the following paragraph, which appeared in a recent issue of the "Electrical Times": "An enterprising photographer could supply the London Press pillory with some striking instances of things left undone that ought to have been done, together with many sins of commission. Take the Thames Embankment for instance. Just to the east of Charing Cross Bridge there is a point where the irreproachable cleanliness of the Gas Company's lanterns may be compared with the sable filth of the arc lamps along the river parapet. These lanterns were not intended for arc lighting; their framework is so solid that it would throw wide shadows over the path in any case. Having adapted the lanterns to electric lighting—for 'adapted' read 'forced into service'—the least that the London County Council could have done would have been to fit them with suitable glass and keep them scrupulously clean. The glass is unsuitable, and it is in such a filthy condition that only a small percentage of the light can trickle through it. This is most unfortunate, for the gas people apparently keep men constantly at work on their lanterns and mantles, with a result that one cannot help admiring."

The Training of Engineers.—At the first meeting of the Society of Engineers for the present year, held on Monday last week at the Royal United Service Institution, Whitehall, the President (Mr. J. W. Wilson) referred in the course of his Inaugural Address to the training of engineers. He showed that, though we are careful to apply common sense to the "raw material" in our engineering manufactures, we often fail to do so in the production of the engineer himself. He emphasized the comparative failure of our leading schools in this respect, and urged that they should devote their great opportunities to a more practical end, so that the grievous waste of time, now so common when a youth embarks upon his profession, might be as far as possible removed. Recognition was made by the President of the improvement in the treatment by the ordinary Press of the engineering profession; and it was urged that the engineer should not be ignored when notice was published of the inauguration of some important scheme, to the success of which he had doubtless contributed more than anyone else.

PHENOLS IN GAS LIQUORS.

In the "JOURNAL" for the 10th of December, brief reference was made to a paper on this subject read on the previous Friday, by Dr. F. W. SKIRROW, M.S.C., before the Manchester Section of the Society of Chemical Industry. The text of the paper, the full title of which is "The Determination of Phenols in Gas Liquors, and the Distribution of such Phenols in the Liquors Obtained in Various Parts of the Gas-Purifying Plant," appears in the current number of the Society's "Journal," from which we reproduce it.

Determination of Phenol in Gas Liquors.—For this purpose a method was employed which was similar to the one used by Korn for the estimation of phenol in effluents. This is based on the volumetric method of Messinger and Vortmann (see also Kossler and Penny). In applying the method to gas liquors, certain modifications are necessary in order to obtain reliable results; and in the following the method so amended is described.

The phenol is distilled off with water and converted into tri-iodophenol by means of an excess of iodine, which is titrated back with thiosulphate. The reactions involved are the following:—

$$(1)\ 2NaOH + 2I = NaIO + NaI + H_2O.$$
$$(2)\ C_6H_5OH + 3NaIO = C_6H_2I_3OH^{*} + 3NaOH.$$

These reactions are equivalent to:—

$$C_6H_5OH + 6I = C_6H_2I_3OH + 3HI.$$

On acidification, the following reaction takes place:—

$$NaIO + NaI + H_2SO_4 = I_2 + Na_2SO_4 + H_2O.$$

Thus the whole of the unused iodine is set free and can be titrated. The following precautions must be adopted: (1) Sulphuretted hydrogen and sulphides must first be removed. (2) Hydrocyanic acid and cyanides must be eliminated. (3) On evaporating the liquor, it must be permanently and strongly alkaline.

Of the filtered gas liquor, 100 c.c. are first treated with an excess of ammonium polysulphide to convert any cyanide present into thiocyanate. This is allowed to stand, and the solution is then made up to 200 c.c. The sulphides are afterwards precipitated, most conveniently by lead carbonate, and the lead sulphide and the excess of lead carbonate filtered off. An excess of sodium hydroxide (25 c.c. of 50 per cent. solution) is then added to 100 c.c. of the filtrate, and the solution evaporated until the salts begin to separate out. The residue is washed into a litre distilling flask and diluted to about 150 c.c. with distilled water, and when cold is acidified with sulphuric acid. The liquid is distilled until the salts begin to crystallize out. We thus obtain "Distillate No. 1." Then 100 c.c. of water are added to the distilling flask, and the acid liquor is again distilled into a second receiver, giving "Distillate No. 2." This is repeated a third time, giving "Distillate No. 3." The whole of the phenol will usually be in these three distillates—a control test having shown that the amount of phenol in a fourth distillate was negligible. In order to get rid of any acid which has distilled over, and which would upset the subsequent titration, each of these distillates is then shaken with about 1 gramme of calcium carbonate (and a small quantity of lead carbonate to keep back any of the hydrogen sulphide), and redistilled. In doing this, Distillate No. 1 is distilled first, No. 2 is then added to the distilling flask and distilled, and No. 3 is distilled last. The final distillates are then united and made up to 500 c.c., when they are ready for titration.

It was found that if cyanide were present, the hydrocyanic acid which distilled over on the first set of distillations was not retained by the calcium carbonate, and thus passed into the final distillates, and caused too large an amount of iodine to be taken up. In the case of thiocyanate, however, it was found that the thiocyanic acid which distilled over, being a stronger acid than hydrocyanic acid, was practically completely retained by the calcium carbonate. Thus, on converting the cyanide into thiocyanate, all trouble on this score was avoided.

The titration of the final distillate was carried out as follows: 100 c.c. of the united distillates was made alkaline with sodium hydroxide and warmed to 60° C. An excess of iodine was then run into the flask, which was immediately stoppered and allowed to cool, with frequent shaking. The contents were then titrated back with decinormal sodium thiosulphate after acidifying the liquid—starch being used as indicator. The end point is marked by the transition from blue to a rose pink. If much phenol is present, a flocculent rose pink precipitate is obtained. If we combine the two equations (1) and (2), we see that for every molecule of phenol present, three molecules of sodium hydroxide are permanently converted into sodium iodide. Therefore, at least three molecules of sodium hydroxide must be present for one molecule of phenol. The titration was tried, using a large excess of sodium hydroxide ($6NaOH : C_6H_5OH$); but it was found that in this case the end point was not quite so sharp as with a smaller excess. The amount of iodine used was enough to colour distinctly the liquid. It was found advisable to do a preliminary titration, using a large excess of sodium hydroxide (2 c.c. of normal NaOH), in order to determine approximately the amount of phenol present, and then to carry out the main titration, using 4 molecules of sodium hydroxide to each molecule of phenol, as so approximately estimated.

Trial Tests with Known Amounts of Phenol.—(*a*) Direct titration of pure phenol solution gave 99·5 and 99·5 per cent. of the amount of phenol taken. (*b*) Analysis of a mixture of pure phenol and ammonium polysulphide, carried out by the method described, gave the following results: Weight of phenol taken, 0·427 gramme; weight found, 0·418 gramme—*i.e.*, 97·8 per cent. of the amount taken.

Blank tests were then carried out to find the influence of the presence of thiocyanate and thiosulphate on the accuracy of the test. A solution of 0·27 gramme of sodium thiocyanate in 30 c.c. of water was taken and treated just as in the phenol test. It was found that the iodine taken up was equivalent to 0·0005 gramme of phenol. Tests were also made on the influence of sulphur dioxide. If thiosulphates or sulphites were present in the liquor, sulphur dioxide would pass over in the first distillation with acid. A solution of sulphur dioxide was therefore treated with calcium carbonate and immediately distilled. No measurable amount of sulphur dioxide was found in the distillate. It is thus evident that the presence of thiosulphates, sulphites, and thiocyanates in the gas liquor will have no influence on the accuracy of the test as described.

In the first set of analyses which was carried out, the amount of sodium hydroxide used on titration with iodine was only about equivalent to the phenol present; while the iodine was only added until sodium hypoiodite was present (as ascertained by acidifying a drop of the solution and testing with starch solution). The titrated solution was colourless, and a white precipitate was formed if much phenol was present. A sample of pure phenol was dissolved in water, and the solution titrated in this manner. The found percentage of phenol, calculated as the tri-iodophenol, was as follows: 66·9, 74·6, 70·2, 71·5. Thus, under these conditions, the amount of iodine taken up appeared roughly to correspond with the formation of di-iodophenol.

The following tables contain the analyses of a number of liquors from various points of the condensing and washing plant at several gas-works; the phenol being determined as described. The results in every case are given directly without correction.

TABLE I.—*Works "A."*

Point of Sampling.	Degrees Twaddel.	Ounce Strength.	Grammes per 100 c.c.	
			Ammonia.	Phenol.
Hydraulic main	4·1	6·7	1·45	0·341
Scrubber outlet	5·6	8·6	1·87	0·292
"Standard" washer outlet*	6·2	10·2	2·21	0·317
Well	3·9	6·5	1·41	0·262

* In all cases when dealing with liquors, the "inlet" or "outlet" refers to the *liquor inlet* or *liquor outlet*.

In these works the "Standard" washer is fed with pure water, while the scrubber is fed with the liquor from the well, which then runs into a small tank and is circulated through the scrubber up to the desired strength, when it is pumped into a separate tank for delivery. The sample from the scrubber outlet was taken from this delivery tank.

TABLE II.—*Works "B."*

Point of Sampling.	Phenol per 100 c. c.
	Gramme.
Livesey washer outlet	0·32
"Standard" washer outlet	0·02
Livesey washer outlet	0·04
Clapham washer outlet	0·03

In the above works, the "Standard" and Clapham rotary washers are fed with water, while the Livesey washers are fed from the corresponding rotary washer—no liquor from the well being used.

TABLE III.—*Works "C."*

Point of Sampling.	Phenol per 100 c. c.
	Gramme.
Livesey washer inlet	0·21 } sampled
Livesey washer outlet	0·20 } on same
"Standard" washer outlet	0·02 } date.
" " "	0·04

At Works "C" the Livesey washers are fed from the well, and the liquor from them flows back to the well.

In Table IV., the results are given, in grammes per 100 c.c., of analyses of the liquors from various points at Works "C;" the samples being taken simultaneously.

In the determination of the sulphur, the liquor was titrated directly with iodine, and the sulphide precipitated as zinc sulphide and titrated separately; the difference being calculated on the assumption that it is present as thiosulphate.

The flow of the liquor through the Livesey washers at Works "C" amounted to about 3000 gallons per million cubic feet of gas passed. At Works "B," on the other hand, the flow through the Livesey washers, being simply the liquor from the "Standard"

* Messinger and Vortmann state that the body actually formed is more probably $C_6H_3I_2.OI$.

TABLE IV.—*Works "C."*

Point of Sampling.	Phenol.	Free Ammonia.	Fixed Ammonia.	Sulphur as Hydrogen Sulphide.	Sulphur as Thiosulphuric Acid.	Carbon Dioxide.	Degrees Twaddel.
	Grammes.	Grammes.	Grammes.	Grammes.	Grammes.	Grammes.	
Hydraulic main*	0·327	0·702	0·780	0·126	0·256	0·594	2·9
Primary condenser	0·245	2·862	0·130	0·148	0·128	2·266	4·5
Livesey washer { inlet (well)	0·211	1·552	0·568	0·521	0·160	1·408	3·8
" " { outlet	0·215	2·588	0·572	1·285	0·172	1·969	5·0
"Standard" washer outlet	0·033	2·311	0·030	1·088	0·096	2·332	4·6

* The sample from the hydraulic main was taken twelve hours after flushing out with liquor from the well.

washers, amounted to about 500 gallons per million cubic feet of gas passed, or only about one-sixth of that at Works "C."

From Tables IV. and V., we see that the concentration of the phenol in the liquors from the hydraulic main and condensers (*i.e.*, in the condensed liquor) is about ten times the concentration in the liquor from the "Standard" washers (*i.e.*, in the added water).

Taking into account that the amount of condensed liquor is about five times the amount of water added, the phenol washed out in the condensed liquor must be fifty times the amount of phenol washed out by the added water. The concentration of the phenol in the liquors from the "Standard" washers at Works "B" is of the same order as that at "C." The case at "A," however, seems to be different. (*cf.* Table I.) Another sample of the liquors from these works was therefore taken; and the following results were obtained:—

TABLE V.—*Works "A."*

Point of Sampling.	Phenol per 100 c. c.
	Gramme.
Tower scrubber (after circulation)	0·335
"Standard" washer outlet	0·159
Well	0·374

The percentage of phenol in the washer liquor is thus considerably less than in the case of the previous sample taken. It is, however, still considerably greater than in the case of the washer liquor at Works "B" and "C."

Taking the amount of condensed liquor at Works "A" as being five times the amount of the added water, the total amount of phenol in the former is from five to ten times the amount of phenol in the added water. The reason for the larger amount of phenol in the added water in the washer liquor was not further investigated, but it is possibly connected with the variation in the amount of carbon dioxide in the gas, the quantity of this at the time of investigation being excessive. At these works, Chance's polysulphide cyanide process was in use; the cyanide washer being immediately before the tower ammonia scrubber. At the time of these tests, the thiocyanic acid was also being driven forward (probably by the carbon dioxide) into the washer liquor, and the liquor from this washer contained more thiocyanate than any other washer liquor we have investigated.

The analyses of liquors from another gas-works are given in Table VI. In this case the amount of phenol in the liquors from the washer is even smaller than at Works "B" and "C."

TABLE VI.—*Works "D."*

Point of Sampling.	Phenol per 100 c. c.
	Gramme.
Hydraulic main	0·239
Scrubber inlet	0·197
Scrubber outlet	0·202
"Standard" washer outlet	0·013

Determination of the Phenol in Various Deliveries of Gas Liquor.—The samples analyzed were the average of the January and February deliveries.

TABLE VII.

—	Phenol per 100 c. c.
	Gramme.
(1) Yorkshire liquor	0·303
(2) Derbyshire liquor	0·328
(3) Lancashire liquor	0·213
(4) " "	0·213
(5) " "	0·363
(6) " "	0·323

The following tables contain analyses of ammoniacal liquors from coke-ovens:—

TABLE VIII.—*Liquor* (2·26° T.) *from Yorkshire Simon-Carvès Ovens.*

Phenol	0·103	gramme per 100 c.c.
Ammonium thiocyanate	0·074	" "
Free ammonia	0·764	" "
Fixed ammonia	0·200	" "

TABLE IX.—*Liquor* (1·8° T.) *from Lancashire Semet-Solvay Ovens.*

Phenol	0·191	gramme per 100 c.c.
Ammonium thiocyanate	0·065	" "

Determination of the Amount of Phenol Vapour in the Gas at Works "C."—This determination was carried out by passing the gas through a train of washers containing sodium hydroxide solution; the gas being first freed from tar fog by filtering through cotton wool as in the tar-fog tests.* The gas passed through a tube containing cotton wool, which was placed inside the main in order to be at the same temperature as the gas. From this it passed through two gas-washers containing 500 c.c. of 20 per cent. sodium hydroxide solution, and finally through a test-meter. About 20 cubic feet of gas was passed through in each case; and it was found that at the end of the experiment about half the caustic soda was left unchanged—thus being always in large excess. Much more cyanide was absorbed than in the case of gas liquor, and it was found advisable to first convert this into ferrocyanide and remove it before proceeding to estimate the phenol. A check test showed that practically no phenol was lost in the process. The amount of phenol in the solutions obtained was too small to be estimated accurately in the usual way; and the following method was therefore adopted in order to estimate the phenol present. A determination was made of the concentration of phenol at which, on titration in the usual way with iodine and thiosulphate, the rose-pink colour of the tri-iodophenol just ceased to be visible.

Solutions were made up containing 0·0010 per cent., 0·0005 per cent., and 0·00025 per cent. of phenol; and 250 c.c. of these solutions were taken, caustic soda added, and the titrations carried out in the usual way, with iodine and thiosulphate, The first of these solutions showed a very strong rose-pink colour; the second was still very distinctly coloured; while the third had the faintest tinge of rose pink, just on the limit of visibility of the colour. The caustic soda solutions through which the gas had been passed were made up to a known volume, and an aliquot part was freed from cyanide, distilled, and the distillates made up to 250 c.c. and titrated in the usual way. The end-point solution, if coloured, was then diluted to the limit of visibility of the colour, and the amount of phenol thus estimated.

Samples of gas were drawn off from the inlet and outlet of the Livesey washers, the outlet of the "Standard" washers, and also from the inlet to the primary condensers. The tar fog in the gas was estimated at the same time. The following results were obtained:—

Inlet† to the Livesey Washers.—Tar Fog: 100 cubic feet contained 13·1 grammes of tar. Phenol Vapour: The solution from the washers was made up to 1000 c.c., and 300 c.c. tested for phenol; and the end-point liquor showed only the faintest trace of pink colour.

Outlet from the Livesey Washers (inlet to the "Standard" Washers).—Tar Fog: 100 cubic feet contained 1·74 grammes of tar. Phenol Vapour: No trace of pink in the titrated liquor.

Outlet from the "Standard" Washers.—Tar Fog: 100 cubic feet contained 1·69 grammes of tar. Phenol Vapour: No trace of pink in the titrated liquor.

Inlet to the Primary Condensers.—In this case an empty gas-washer was introduced between the cotton-wool filter and the caustic soda washers, in order to condense the bulk of the moisture separately. A considerable quantity of liquor condensed in this washer, and the phenol in this was estimated separately. The phenol in the caustic soda washers was estimated, as before, by diluting the liquor to the limit of visibility of the rose-pink colour. The results obtained are contained in Table X.

TABLE X.

Point Tested.	Temperature. Degs. Fahr.	Phenol (in Grammes) per 100 Cubic Feet of Gas.		
		Condensed Liquor.	Caustic Soda.	Total.
Condenser inlet	121	0·81	0·06	0·87
	124	1·15	0·11	1 26
Livesey inlet	75	..	..	0·015—0·010
Livesey outlet	71	..	..	Less than 0·010
"Standard" outlet	66	..	..	" " "

These figures are of interest for their bearing on the treatment of effluent from sulphate of ammonia works, as showing that any attempt to prevent the ammoniacal liquor from taking

* *Cf.* paper by the author and Mr. R. H. Clayton. B.Sc., in the "JOURNAL OF GAS LIGHTING" for June 4, 1907 (p. 660).

† In these experiments on the phenols in the gas, the "inlet" or "outlet" refers to the *gas inlet* or *gas outlet*.

up phenol by removing the tar from the hot gas would be ineffective; sufficient phenol vapour being present in the gas at the inlet to the primary condensers to account for the phenol dissolved in the condensed liquor from these condensers.

It must be noted in connection with the experiments on the amount of phenol vapour in the gas, that the gas is first passed through a cotton-wool filter, which becomes gradually coated with tar fog. It is possible that this tar will not be in equilibrium with the gas as regards phenol. The tar fog will have been precipitated at a higher temperature than that existing at the point where the determination is made, and consequently the tar fog, on cooling down, would tend to take up more phenol from the gas. It is possible that the interchange of the phenol between the gas and the tar may be slower when the tar is floating in the gas than when it is brought into intimate contact with it on the filter. [On the other hand, the amount of tar fog present at the inlet of the primary condenser and Livesey washer is much greater than at the outlet from the Livesey and "Standard washers."] From these causes the figures for the phenol vapour in the gas are probably somewhat low. At any rate, the amount of phenol vapour at the inlet to the primary condensers is greater than at the inlet to the Livesey washer or the outlet from the "Standard" washers.

If we assume that the amount of phenol vapour at the inlet to the washers does actually amount to 0·01 gramme per 100 cubic feet, and that the flow through the washers amounts to 5 gallons per ton of coal carbonized, we see that the gas contains quite sufficient phenol to give a liquor containing 0·005 gramme of phenol per 100 c.c. The liquor actually contains from 0·02 to 0·04 gramme per 100 c.c. The difference is probably partially accounted for by the ammonia in the liquor dissolving phenol from the tar fog passing forward. In the case of the primary condensers, if we assume the flow of condensed liquor as 5 gallons per ton of coal, and the phenol in the gas at 1 gramme per 100 cubic feet, this could give a liquor containing 0·4 gramme of phenol per 100 c.c. The liquor actually contains 0·25 gramme of phenol per 100 c.c. A comparison was made of the tar obtained from the Livesey washer with the average tar from the well at the same gas-works. The heavy naphthas were determined and also the tar acids. It was found that though there was three times as much heavy naphtha in the tar from the Livesey washer as in the tar from the well, yet the former only contained about three-fifths of the amount of tar acids which the latter contained. It thus seems certain that the tar acids are being largely washed out from the tar fog. If we take into account that, up to the primary condensers, the gas contains sufficient phenol vapour to account for the phenols found in the liquor from these condensers, we see that this washing of the tar fog must occur largely in the Livesey washers.

Extraction and Examination of the Tar Acids contained in Gas Liquor.—A large batch of gas liquor, taken from the well at Works "C," was first acidified with sulphuric acid to remove the excess of sulphuretted hydrogen and carbon dioxide. Sufficient caustic soda to neutralize the excess of acid and to drive off the whole of the ammonia was then added, and the entire batch repeatedly boiled down and the sodium sulphate allowed to crystallize until the mother liquor was reduced to small bulk—care being taken that a sufficient excess of caustic soda was present to prevent loss of phenol. The resulting phenate was acidified with sulphuric acid and the phenols extracted. These were then distilled through a four-bulb Le Bel column. The mixture distilled as follows:—

TABLE XI.

Temperature. Deg. C.	Volume in Cubic Centimetres.	Remarks.
177—180	18	Crystallized.
180—181	33	,,
181—182	38	,,
182—184	25	,,
184—186	18	Partially crystallized.
186—193	22	Liquid.
193—197	8	,,
197—280	10	Without column.

These fractions were again systematically fractionated. The crystalline fractions were drained on the pump and the crystals united; the drainings being added to the liquid fractions.

The following products were thus obtained: (1) Crystallized phenol; (2) cresols and crystal drainings; (3) high-boiling residue. A further examination of these gave the following figures:—

TABLE XII.

Per Cent. on Original Tar Acid.		M. pt. Deg. C.	B. pt. Deg. C.	Contains per Cent. of Phenol.
(1)	58	30—36	179—184	89
(2)	34	..	184—201	36
(3)	8	..	..	..

Thus, the original tar acid washed out by the ammonia liquor contained 65 per cent. of pure phenol.

Hence, though the tar contains a much larger amount of cresols than of phenol, yet, owing to the more feeble acid nature of the cresols, the phenol is preferentially washed out by the ammoniacal liquor. The amount of pure phenol which is lost in the liquors, calculated from the above figures, amounts to 0·37 to 0·55 lb. per ton of coal carbonized; while the amount of pure phenol recoverable in the tar is only 0·53 lb. per ton of coal carbonized. Thus about half the pure phenol produced in the retorts is lost in the liquor.

Determination of the Correction to be applied to the Percentages of Phenol in Gas Liquor due to the Fact that the Liquor contains both Phenol and Cresols.—The analysis was carried out in the usual way on known solutions of the phenols and cresols extracted from the gas liquor. One gramme of the phenol and cresol respectively was dissolved in water and made up to 500 c.c. The analysis of this solution was then carried out as described at the beginning of this paper—the solution not being distilled but directly titrated. The following results were obtained: Phenol solution from gas liquor: 100 c.c. = 1·604 grammes of iodine = 0·198 gramme of phenols (calculated as phenol). Cresol solution from gas liquor: 100 c.c. = 1·426 grammes of iodine = 0·176 gramme of phenols (calculated as phenol). If we now take into account the relative volume in which the phenol and cresol fractions were obtained, we arrive at the following result: 1 gramme of average tar acid = 7·691 grammes of iodine = 0·950 gramme of phenols (calculated as phenol). We thus see that the results are about 5 per cent. low, due to the presence of cresols in the gas liquor.

Determination of the "Oxygen Absorption" by the Phenols, &c., from Gas Liquor.—These determinations were carried out by the method used in sewage works analyses. A very dilute solution of the tar acid was prepared; 1 gramme being dissolved to 500 c.c., and 10 c.c. of this further diluted to 500 c.c. The solution thus contained 0·002 gramme of tar acid in 50 c.c. of the solution. The oxidation of 50 c.c. of the solution was carried out by 50 c.c. of a dilute potassium permanganate solution (0·79 gramme per litre) in the presence of dilute sulphuric acid. The reaction was stopped at the end of the desired interval by the addition of about 1 c.c. of 10 per cent. potassium iodide solution. The liberated iodine was titrated with a dilute thiosulphate solution. A blank test with water alone was carried out simultaneously. The oxidations were carried out at a constant temperature (23° C.). The following results were obtained: Phenol solution *ex* gas liquor (three minutes test), 1 gramme of phenol = 1401 grammes of oxygen. The above phenol is, of course, not free from cresol. Cresol solution *ex* gas liquor (three minutes test)—the cresol contains phenol. One gramme of cresol = 1245 grammes of oxygen. Average tar acid *ex* gas liquor: 1 gramme of tar acid = 1343 grammes of oxygen. The oxygen absorption by very dilute solutions of thiocyanate, thiosulphate, and ferrocyanide was also determined under the conditions of the test. The following were the results obtained:—

Sodium thiocyanate, 1 gramme = 0·582 gramme of oxygen.
,, thiosulphate, 1 ,, = 0·336 ,, ,,
,, ferrocyanide, 1 ,, = 0·018 ,, ,,

Oxygen Absorption of an Effluent from a Sulphate of Ammonia Works.—10 c.c. of the filtered effluent was diluted to 500 c.c., and 50 c.c. of this solution was tested. 1000 c.c. of effluent = 5·478 grammes of oxygen. This is accounted for as follows:—

TABLE XIII.

—	Grammes present (Calculated as Sodium Salts).	Grammes of Oxygen Required.	Per Cent. of Total Oxygen.
Tar acids	2·12	2·847	52·0
Sodium thiocyanate .	3·14	1·827	33·3
,, thiosulphate .	1·58	0·530	9·7
,, ferrocyanate .	0·28	0·005	0·1
Other bodies . . .	..	0·269	4·9
			100·0

The influence of the phenols on the solution of the naphthalene problem remains to be briefly discussed. It is contended that phenols have a very important influence on the deposition of naphthalene from crude gas, which naphthalene in many gas-works comes down in a flaky crystalline condition; thus causing blockages in the distributing system, both in the works and in the districts supplied. The supposition is that if the tar fog be extracted hot the phenols (and light oils) go forward in the gas,* as has been shown in Table X., and on cooling deposit along with the naphthalene as a solvent, thus keeping it in the liquid form. Mention has also been made of the action of ammoniacal liquor on the phenols in the gas and tar fog—thus removing one of the best naphthalene solvents.†

So far as we know, no quantitative estimations on this point have been carried out;‡ but it is hoped that the method here described and the results obtained will be of value to those engaged in investigating this problem. It was hoped that these figures would show something more definite on the naphthalene question; but in this work the experiments were not carried sufficiently far to warrant any definite statement being made on the subject. The investigation from which these results are drawn

* *Cf.* Everitt, "JOURNAL," Vol. LXXXVIII., p. 700. H. G. Colman, *Ibid*, Vol. XCVI., p. 524.

† White and Clary, "JOURNAL," Vol. XCII., p. 388.

‡ White and Clary, *loc. sit.*, estimated the phenol in scrubber liquor by shaking out with chloroform and weighing the extract, and stated that these liquors contained about 0·3 per cent. of phenol.

not bearing directly on this question, it was impossible to devote further time to the elucidation of this point.

Discussion.

Mr. S. GLOVER said, with regard to the proportion of phenols which went to the gas liquor and that which stayed in the tar, where they were of value, he could not help thinking that the process of condensation, which brought the tar into close contact with the crude gas, would increase the proportion of phenols in the tar; but when there it would be necessary to keep the tar, whether in the form of mist or otherwise, from coming into contact with strong ammoniacal liquor, lest the phenols be reabsorbed and reappear in the effluent liquors of the sulphate of ammonia plant. The keeping of the phenols in the tar, where they were of some value, would be assisted by the insertion in the gas-works plant of a tar-extractor, the function of which was to remove from the crude gas the suspended globules of tar, which would otherwise get into the washers and scrubbers, where the phenols would be absorbed by the ammoniacal liquor. If the tar vapour was the vehicle by which the phenols came into contact with the strong liquor, the tar vapours had better be removed from the crude gas before it touched the strong liquor. That there were less phenols found in the liquor from the outlet of the weak liquor finishing washer was due to the fact that the strong ammoniacal liquor in the first washers had already taken out the bulk of it. They also would be glad of a practical process which would remove such phenols as were carried away by the ammoniacal liquor, so that the effluent liquor from ammonia works would not interfere with the bacterial treatment of sewage.

Mr. W. IRWIN said, as predecessor of Dr. Skirrow at the Miles Platting Works, he made experiments twenty years ago on the determination of phenols in treating solutions in contact with tar oils. He used the bromide method; and while his results were not so accurate as those of Dr. Skirrow, they were sufficiently so to show that in the manufacture of carbolic acid as then conducted they were losing 20 to 25 per cent. of pure phenol in the neutralized sulphate of soda solution. This result, in addition to the saving in caustic soda, led him to experiment on, and ultimately to substitute, carbonic acid for sulphuric acid for neutralizing the phenate of soda solution. Dr. Skirrow gave as the reason why there was more phenol than cresol in the ammoniacal liquor that the former was a stronger acid that the latter. Was it not quite as reasonable to assume that, seeing there was an excess of carbonic acid present, it was due to the fact that phenol was so much more soluble in water than cresol? He should like to ask Dr. Skirrow if he had studied the influence of the temperature of carbonization on the production of phenols and their solutions in the ammoniacal liquor at various points of condensation. Also, if he had compared the influence of temperature on the vapour tension of phenol with that of naphtha of similar boiling-point. This might throw light on the question why there was more deposit at one point than at another.

Mr. RAYMOND ROSS said he had tried the process of phenol estimation. In the Burnley gas liquor there was 0·290 per cent. of phenol, and to this they added 0·05 per cent. of pure phenol and estimated by the process described in the paper with very accurate results. He estimated the phenol in the waste liquor from the still, and found 0·115 per cent.—thus showing a loss of 60 per cent. of phenol in the process of manufacture. The lime was fed into the still with hot waste liquor.

Mr. E. ARDERN said he was chiefly interested in the composition of the effluent from ammonium sulphate plants, as he was concerned with its ultimate purification and disposal. The information contained in Table XIII. was very interesting, as showing the effect on the general composition of the sewage of the admission of such effluents to sewers. This effect was more strikingly shown if the amount of oxygen absorbed from permanganate by the waste liquors was expressed in grains per gallon—terms in which the strength of sewage was often given. Taking the figures in the table, this was found to be equivalent to nearly 400 grains per gallon. [The average oxygen absorption of Manchester sewage was 7·5 grains per gallon.] The effect of such waste liquors obviously depended on the relation of the volume to the total flow of sewage. In the case of Manchester, the proportion of this liquor was much greater than was usual, owing to the fact that, in addition to the recovery of ammonia from the ammoniacal liquor produced at the gas-works of the Corporation, quantities of outside liquors were also dealt with in the city. The total volume of waste liquors from sulphate of ammonia plants entering the sewers was such that the oxygen absorption of the average sewage of Manchester was increased by between 1 and 2 grains per gallon. Thus, while no special difficulty in connection with the purification of the sewage was introduced, it would be seen that the presence (in the case of Manchester) of waste liquor from sulphate of ammonia plants considerably increased the amount of oxidizable matters in the sewage; and so long as the Rivers Authority employed the oxygen absorption from permanganate as a standard test of purity of sewage effluents, a consequent increase in the necessary purification works was entailed. In connection with the question of the purification of the effluent from sulphate of ammonia plants, it was important to determine how far the oxygen absorption was due to each of the various constituents. Analyses had been made at Davyhulme which agreed fairly closely with the results given by the authors in Table XIII. He was astonished to learn that one-half of the total phenols produced from the coal was contained in the ammoniacal liquor, and therefore was at present lost. Reference to the table quoted would show that more than 50 per cent. of the oxygen absorption of the waste liquor from the recovery of ammonia was due to the presence of tar acids. It therefore appeared to him—though he was quite unaware as to how far it was practicable—that attention should be directed to the question of collecting the phenols apart from the ammoniacal liquor, which would not only result in a double yield of phenols, but would considerably reduce the difficulty of dealing with the waste liquor.

Mr. W. H. COLEMAN thanked Dr. Skirrow for insisting upon the more rational method of stating the quantity of ammonia in liquor in grammes per 100 c.c. instead of as ounces. With reference to Mr. Ardern's remarks, he did not think the recovery of 0·5 lb. of phenol per ton of coal presented any great possibilities financially. Its value was only about 0·9d. per ton of coal, or about 0·03d. per gallon of liquor.

The CHAIRMAN (Mr. R. H. Clayton) said, with regard to Table X., they would observe that though the tar fog had been separated from the gas by the cotton-wool filter, the phenol vapour passed forward when the temperature was fairly high. Any separation of the tar, therefore, at high temperature would not prevent the phenols going forward and getting into the ammoniacal liquor that was condensed late. The bulk of the liquor condensed in the hydraulic main, which liquor also contained a large amount of phenols. Anything done to the gas after it left the hydraulic main would not greatly influence the total amount of phenol present in the final liquors. The results seemed to show that 0·3 per cent. was about the maximum quantity of phenol which could be absorbed in the condensed liquor; and this figure was fairly regular for liquors obtained from very different materials.

Dr. SKIRROW, in reply to Mr. Irwin, said the liquors were not saturated with respect to either phenol or cresol, and therefore the solubility of these bodies in water had no influence on the relative amounts of the two substances taken up. He had not studied the questions of the temperature of carbonization with respect to the problem—the temperatures in each case dealt with being high; and, further, he had not made any study of the change of vapour pressure with temperature. With regard to the loss of 60 per cent. of the phenols from the liquors in the making of sulphate of ammonia, his experience had been that a much larger percentage of the phenols contained in the gas liquor than that mentioned by Mr. Ross found its way into the waste liquor.

INCRUSTATIONS IN WATER-PIPES.

At the last Meeting of the American Water-Works Association, a paper dealing with the above subject was presented by Mr. Nicholas S. Hill, jun. The following particulars are taken from an abstract in "Engineering Record."

The various deposits which lessen the carrying capacity of water pipes and conduits may be divided into three classes: (1) Incrustations, commonly known as tuberculation, on unprotected or imperfectly protected iron pipes; (2) deposits or growths on the inner surface of iron pipes, whether protected or unprotected, and of conduits, rock tunnels, and other channels—the nature of the deposits depending on the chemical constituents or biology of the water, or both; and (3) accumulations of *débris* and mud in invert hollows and dead-ends.

Incrustations are formed in iron pipes by corrosion where the inner surface is not protected or is imperfectly protected. Incrustations begin as minute projections scattered over the surface generally in an irregular manner. In forms they resemble small asymmetrical cones or limpets. They grow by addition in concentric layers. They increase in size and numbers until they ultimately become confluent and form a coating of considerable thickness. A pipe of small diameter is sometimes completely choked by them; but in large pipes the thickness of the deposits seems to be limited to about 1½ inches.

Examples of the space occupied by rust, together with the age of the pipe, are given in the accompanying table. This space is ascertained by filling the pipe with water, noting the quantity, and deducting it from the capacity of the pipe when cleaned.

Age. Years.	Diameter. Inches.	Amount of Rust per Foot. Cub. In.	Capacity of Clean Pipe Lineal Foot. Cub. In.	Per Cent. of Space Occupied by Rust.
29	4	60·79	150·33	40·0
22	4	81·45	150·33	54·0
14	6	60·00	326·68	18·0
15	6	63·33	326·68	19·0
16	10	80·00	941·76	8·4
30	16	440·00	2,419·20	18·0

Limestone, shale, and other rocks from which water dissolves salts of calcium and magnesium, produce waters which contain a large amount of mineral matter. Of these salts, the one chiefly deposited in water-mains is the translucent semi-crystallized scale of calcium carbonate. The character and effect of these deposits is well known. At Bath, 2 inches in length of 6-inch pipe contained 26,786 grains of calcium carbonate, or at the rate of 23 lbs. per lineal foot. Mr. Le Comte states that in San Francisco pipes which have been in use for 20 or 25 years usually show a lime scale on the inner surface, making it somewhat rougher than the new surface of asphalt.

Probably the most serious biological effect produced in pipes is due to the so-called iron organisms belonging to the Crenothrix groups. In some places this slime is easily disengaged from the pipes, and floats away in flocculent masses which seriously impede the service-pipes. In others the coating seems to be more permanent; and in places in England an annual cleaning with brushes or scrapers is resorted to for its removal. Crenothrix possesses the power to increase very rapidly, so that in a few months after the introduction of its germs it covers the pipe walls to a considerable thickness. Its development has been in many cases sudden and without warning, causing serious inconvenience and many complaints.

The remedies or palliatives for these various difficulties are classified by Mr. Hill as follows: (1) Rust, tuberculation or rust nodules—perfect or improved pipe coating or cleaning by scraping. (2) Incrustation due to alkalinity—removal of carbonates by treatment with milk of lime or cleaning by scraping. (3) Biological formations—filtration or filtration and removal of iron or scraping. (4) Sedimentary deposits—clarification by sedimentation, filtration, or otherwise, or flushing and scraping.

The removal of incrustations and deposits in pipes by scraping has not been largely resorted to in America up to the present time; but in England scrapers for cleaning mains have been in use for thirty years. In some places where the Crenothrix is encountered the mains are scraped annually. The following table shows the percentage of gain in delivery reported at places in Great Britain and Ireland as a result of scraping:—

Place.	Size. In.	Per Cent. Gain.	Place.	Size. In.	Per Cent. Gain.
Oswestry	6	54	Omagh	6	300
Lancaster	8	56	Lanark	7	34
Bradford	18	55	Bridge of Allan	6	35
Whitehaven	12	28	Thurso	6	7
Waterford	13	40	Cowdenbeath	6	23
Cupar Fife	7	52	Burntisland	8	43
Merthyr Tydfil	14	30	Torquay	10	28
,, ,,	12	82	Aberdeen	4	107

At Halifax, St. John, Boston, and a few other places in New England, the scraping of water-mains has been practised to some extent. The effect of scraping in Halifax, as stated in a paper before the American Society of Civil Engineers by Mr. E. H. Keating, the City Engineer, in 1882, was very beneficial. The average pressure on 25 hydrants along the water front in February, 1880, 1881, and 1882, was 34·2, 43·5, and 52·4 lbs. per square inch respectively. The pressures taken at the same times at the highest plug in the city were 8, 28, and 34 lbs. respectively. The mains were all heavily tuberculated; the incrustation in some instances being 1½ inches thick.

In Boston the pipes cleaned were not supply mains but the distributing pipes in the streets; the size being 6 and 12 inches. Mr. Dexter Brackett, who described this work before the New England Water-Works Association, stated that the discharge of 6-inch tuberculated pipes was from 25 to 35 per cent. of the quantity which a clean-coated pipe might be expected to deliver on the same head, and that the discharging capacity of the pipes was more than doubled by the removal of the tubercles.

The incrustations and deposits which form in water-mains affect not only the potableness of the water supply, but also the earning capacity of the plant. A surprisingly small amount is spent on the maintenance of water-distribution systems in America, according to Mr. Hill, who has prepared a short table showing such data for five American cities, ranging in population from 15,000 to 450,000, in all of which the distribution is by pumping. In these cities, with one exception where unusual conditions may have existed, the total cost of maintenance of the pipe is less than 2 per cent. of the total cost of repairs, and less than 0·8 per cent. of the gross revenues. The cities were taken at random, and, according to Mr. Hill, are representative of American practice in that a diminution of pressure or capacity in the distribution and supply mains is universally met with supplementary extensions.

Gas Lighting of Railway Vehicles.—"Notwithstanding the large number of alternative systems of electric lighting for rolling-stock now on the market, gas lighting," says a writer in the Engineering Supplement to "The Times," "appears to be more than holding its own against electricity. The greatest drawback to gas lighting systems for railway vehicles is that they are dependent upon stationary supply plants. Nevertheless, at the present time probably 80 per cent. of the passenger cars in service in America alone are lighted by gas. The new inverted mantle lamps are being largely fitted on British and Colonial railways—the London, Brighton, and South Coast Railway being the first line to adopt them in this country. In America, more than 3000 cars have been so equipped; while the Prussian State Railway Administration has contracted for about 3800 cars to be fitted with gas-mantles before the end of 1909, and in France more than 10,000 passenger vehicles are to be similarly equipped. In the old four-flame gas-lamps for railway carriages, about 3 cubic feet of gas were consumed in an hour to give an illumination of 33-candle power. The introduction of the inverted mantle made it possible to get a light of 90 candles with the same consumption of gas. This required the use of a cluster of four mantles. The newest mantle is stated to give from 95 to 100 candles' light with a consumption of 2½ cubic feet per hour. The cost of operation, of course, varies with the price of the gas; but it is stated to average $\frac{1}{32}$d. per hour."

REGISTER OF PATENTS.

Atmospheric Burners for Heating and Lighting.

PARKER, E. J., of Canonbury, N.

No. 2736; Feb. 4, 1907.

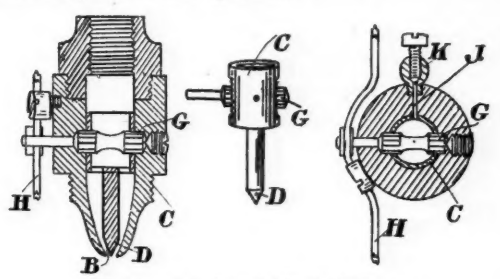
This invention of an "improvement" in bunsen burners consists in a combination of two modifications—both well known. The tubular part of the burner, instead of being of uniform bore throughout its length, consists of two cylindrical parts of different diameters joined together by a funnel-shaped constriction in such a manner that the widest part of the tube is at the upper or flame end. In combination with this, the upper or flame end of the wide portion of the tube is covered with wire gauze. It is found, says the patentee, that by this means "a much higher temperature is obtained than by the old form of bunsen burner, or by a burner provided with gauze alone, or by a burner having the described constriction in the tubular portion but no gauze top, and that the temperature of the flame is more uniform throughout."

Incandescent Gas-Burners.

HINTON, E., of New Bond Street, and ANDREWS, F. A., of Winchmore Hill, N.

No. 5139; March 4, 1907.

This invention relates to gas-burners wherein a needle or point wholly or partially closes the gas inlet, according to the quantity of gas desired to be passed, and in which the needle is raised or lowered by a rack and pinion or their equivalents.



Hinton and Andrews' Adjustable Burner.

Through the outer body or shell, which forms the connection between the supply pipe and the burner, a passage is provided for the gas, with an outlet B leading into the mixing-chamber of the burner. In the centre of the shell a hollow sliding cylinder C is fitted, having a valve D attached to the end nearest the burner. The cylinder is provided with teeth in its opposite sides, forming racks E. It also has a small hole at one side which forms a passage for the gas to the pilot flame when one is required. The two ends of the cylinder are open, to allow the free passage of gas to the burner. A divided pinion G engages in the racks E, and has a handle or lever H, which, arranged in a convenient position without the body, imparts a vertical motion to the valve D.

A stop I is provided for limiting the travel of the lever. The edge of the stop is kept in contact with the lever while the apparatus is being adjusted, and allows it to travel more or less according as to whether it is near or far from the edge of its eccentrically placed head.

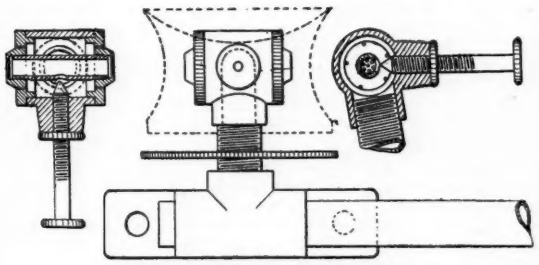
When a pilot light is used, a hole J is drilled through the outer body, which is placed in alignment with the hole in the sliding hollow cylinder C. When the main flame is not alight the two holes are opposite each other, and gas passes to the pilot-light tube K. As the valve D is opened, the holes become out of line with each other, so that the supply of gas to the pilot light is cut off after the main flame ignites. As the valve is closed, the holes become in line with each other again, and gas passes to the pilot so that the pilot light may ignite from the main flame before the main flame is extinguished.

Atmospheric Burners for Gas-Fires.

MAIN, R. B. & A. P., of Falkirk.

No. 11,324; May 15, 1907.

For the purpose of ensuring better combustion of the gaseous mixture in atmospheric burners, the patentees arrange for the latter to be directed to the burners through passages leading in opposite direc-



Main's Gas-Fire Regulating Burner.

tions from a central gas-inlet and two-way nipple; and their presen improvements have for their object "to provide simple means for

regulating the gas supply led through the nipple to the passages when two or more are provided."

In carrying out the invention, the gas supply is connected (as shown) to a small gas-chamber, of cylindrical form, whose ends are finely perforated for the passage of the minimum supply of gas to the burners. Through this chamber a small tube is carried, and is open at each end —being adapted to provide a further supply of gas in order to adjust the bunsen flame when necessary. At mid length of the tube, an opening is made to the gas-chamber for the passage of the gas; the opening forming a seat for a conical or needle valve formed by the end of a small screw-threaded spindle fitted through a cap on the chamber and provided with a knurled disc, whereby it may be turned to more or less close the valve and regulate the supply of gas passing through the tube or two-way nipple.

In a modified construction, the gas-chamber has a vertical web extending inwards from its top or upper side, through which is bored a passage forming the two-way nipple, and an orifice is formed in the web crosswise of this passage, through which orifice is passed the end of the screw-threaded spindle which regulates the gas supply. As in the other example, perforations are formed in the walls of the chamber around the two-way nipple to provide the minimum gas supply.

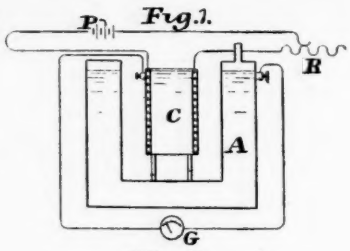
Calorimeters.

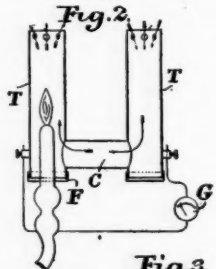
FÉRY, C., of Paris.

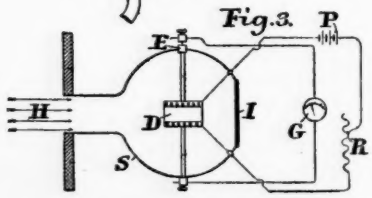
No. 23,996; Oct. 30, 1907. Date claimed under International Convention, Nov. 26, 1906.

This invention relates to a calorimeter wherein the rise of temperature is determined by measuring the electric current generated in a thermo-electric couple of which the hot junction is the part of the apparatus into which the heat to be measured is introduced, or in which the heat to be measured is developed. Three forms of the apparatus are illustrated.

The form shown in fig. 1 is applicable for the measuring of heat evolved in a chemical reaction, or for measuring the heat contained in a hot body by the method of immersion. The calorimeter vessel C, containing the water, is supported by rods T, made of the alloy of copper and nickel (constantan), in an annular vessel A filled with water for protecting the calorimeter from external radiation. Wires are connected with the vessels C and A—one wire being also connected with one terminal of a galvanometer G, while the other is connected with the other terminal. Thus as soon as there is a difference of temperature between the masses of water A and C the galvanometer records a thermo-electric current. This current measures the number of calories imparted to the calorimeter. For calibrating the galvanometer, a coil of wire of high resistance, contained within the double walls of the vessel C, may be put in circuit with a battery P controlled by a rheostat R. By calculating the calories equivalent to the watts consumed in the coil, the heat imparted to the vessel C is known, and the galvanometer may be graduated in calories.







Féry Calorimeters.

Fig. 2 shows an apparatus for measuring the calories produced by the combustion of a gas or liquid. The tubes T, of copper, are identical, and are connected at their lower part by a constantan tube C. In one of the tubes T the gas is burnt. The galvanometer G indicates the difference of temperature between the surrounding air entering one of the tubes T through the perforations at top and the products of combustion escaping through the perforations in the other tube. When the reading of the galvanometer is constant, it is noted together with the volume of gas burnt per unit of time. The galvanometer may be calibrated in a similar manner to that described in relation to fig. 1. For this purpose, the cap F carrying the burner is removed, and for it is substituted an identical cap F^1 supporting a platinum helix P, which can be heated to redness by current from an external source.

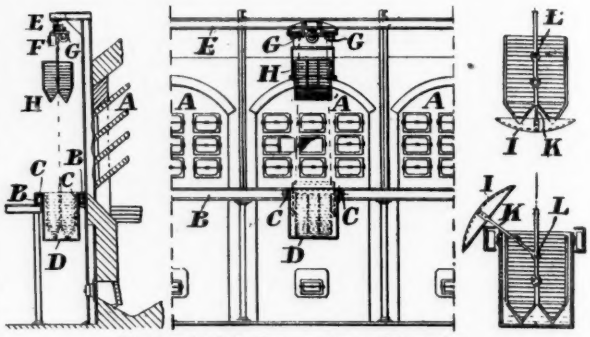
The apparatus shown in fig. 3 serves for measuring heat emitted by radiation. The radiant heat entering at H is received in the small cylinder D, suitably blackened and carrying in its double wall the wire resistance for calibrating the galvanometer G by the current of the battery P controlled by the rheostat R. The wires extend through ebonite plugs in the wall of the sphere S, which protects the cylinder from foreign radiations. The small cylinder D, which receives radiations, is held at the centre of the sphere by the constantan rod below soldered to the sphere and the brass rod above, insulated from the sphere as at E. The cylinder D thus becomes the hot junction of a thermo-electric couple of which the cold junction is on the sphere itself. A screen of cork covered with gold paper on the side turned towards the calorific source prevents the heating of the sphere. Finally, a ground-glass screen I serves for adjusting the position of the cylinder D. The operator observes the shadow of the latter on the screen and then lifts the cylinder until it is at the centre of the sphere. The calibration is effected, as in the previous cases, by measuring the number of watts which must be consumed for producing in the galvanometer G the same deviation as that produced by the radiation.

Quenching and Transporting Coke.

BLEICHERT, M. A. and P. M., of Leipzig-Gohlis, Germany.

No. 19,287; Aug. 27, 1907.

In their specification, the patentees remark that travelling receptacles for the coke directly removed from retorts and coke-ovens, and in which the coke is cooled by water and transported to the desired place, are known; the receptacles being in some instances perforated —the perforations acting as a screen for small coke and allowing the escape of water and steam. By their joint invention, the glowing coke is removed from the retort directly into a perforated receptacle contained during the filling in a water reservoir. The perforated receptacle is separate from, and adapted to the size and shape of, the reservoir; and on the coke being quenched, it is drawn out of the reservoir and then transported direct to the stock heaps. The receptacle and the reservoir travel on rails independently of one another, and are movable separately or together, and can be brought in front of any one of a series of coke-ovens or retort-benches.



Bleichert's Coke Transporter and Quencher.

An example of construction is shown. Here in front of the retorts A, at a fixed height, rails B are arranged on which a water reservoir D can be moved by means of wheels C. Parallel to the rails of the water reservoir D, and above the retorts, a rail E is provided, which serves as a track for a suspended travelling carriage F, provided with arrangements G for raising and lowering the coke receptacle H at any place desired. The receptacle has open walls, or is made of trellis work. In order to prevent any water that may remain in it from dripping when the coke is being transported under the vessel, a movable drop-shell is arranged to be fastened by means of the rods K, which are movable at the sides of the transport receptacle round pivots L. While the load-receptacle is travelling, the drop-shell I is below the bottom of same, and during the dipping into the water it is lifted upwards.

If the coke has to be removed from a certain retort, the reservoir D, which is filled with water to a certain level, is pushed before the retort. Then the carriage F on the rail E, which leads along the bench, is put in movement, and travels to the desired spot, where the receptacle H is lowered into the water reservoir D, at the same time moving the drop-shell I upwards—the shell placing itself on the track B. As the walls of H are open or made of perforated sheet metal, it will be filled with water. The coke is now removed from the retort and falls into the box, and is at once quenched. After the emptying of the retorts and the quenching of the coke, the receptacle H is hoisted from the water reservoir to the proper height for transport; the drop-shell I at the same time being moved back under the bottom of the vessel. The car then travels to the stock heaps, and there delivers its loads.

Pressure-Gauges.

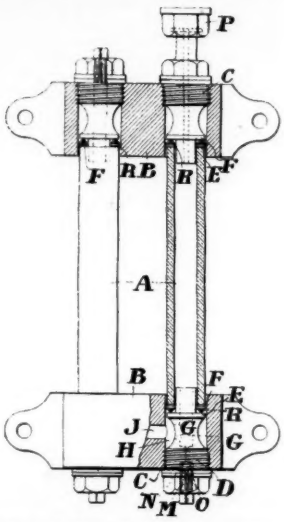
HELPS, J. W., of Croydon, and CLOUDSLEY, JUN., J. L., of Reigate.

No. 14,860; June 27, 1907.

In this pressure-gauge, the glass tubes are held in castings having, opposite the ends of the tubes, openings which are closed by simple hollow waisted plugs screwed into the casting—each plug, on being screwed in, making a joint on one end of the tube and on the face of its corresponding casting. In this way, such stuffing-boxes as have hitherto been used with hollow-waisted plugs in boiler-gauge fittings are dispensed with, as also are intermediate screwed rings interposed between the ends of the tubes and hollow plugs as sometimes used in gauge-fittings.

As shown, the glass tubes A fit at each of their ends into castings B.

At their outer ends C the holes are screwed, and into these screwed parts there fit hollow plugs D, which have each a reduced portion passing easily inside the glass tube and leaving a shoulder E, on which rests a washer F. Between E and F is inserted a washer R (preferably of triangular section as shown), a flat side of it resting against the rubber ring F, while an angular edge rests on the plug shoulder E. This washer R is to prevent twisting of the glass tube when tightening up the joints by screwing the end plugs. When the plugs at the ends of the glass tubes are screwed into place, the washers F are pressed tightly against the ends of the glass tubes and the sides of the holes in the castings B, and thereby effect tight jointings.



Helps and Cloudsley's Pressure-Gauge.

Below the shoulder E in each of the lower plugs is a narrowed portion forming a waist, through which is a hole G, communicating with the interior of the hollow plug and with the space H. A hole J establishes communication between the lower ends of the plugs.

In the case of the top plug, the central hole passes right through (say) the left-hand plug; while the right-hand top plug is provided with a nipple P, for attaching it to the gas-main or wherever it is desired to measure the pressure. The lower plugs have holes passing right through them, normally closed by pins M having coned points N. Each pin is provided with a central hole communicating with a cross hole O, having its upper outlet at the coned part of the pin. The coned surface of the pin bears against a correspondingly coned part in the plug.

With this construction the glass tubes may be drained by turning the pin M so as to open the end of the cross hole O, and thereby allow water to drain through the central hole in the pin. In this way, the objection associated with the usual form of pet cocks is avoided, where it is necessary to take out the cock barrel in order to remove the plug when it is desired to dismantle the gauge.

APPLICATIONS FOR LETTERS PATENT.

1775.—Bradshaw, W., "Detecting leakage from water-pipes." Jan. 27.
1787.—Atkinson, H., "Rotary pumps and meters." Jan. 27.
1789.—Pearce, H. J., "Intermittent gas lighting." Jan. 27.
1844.—Zechnall, L., and Altman, J., "Inverted regenerative incandescent gas-lamps." Jan. 27.
1852.—Lake, W. E., "Mantles." A communication from Akt.-Ges. für Selas-Beleuchtung. Jan. 27.
1853.—Watkins, W. D., "Fuel." Jan. 27.
1881.—Cranmer, G., and Cheshire, H., "Inverted burners." Jan. 28.
1882.—Smith, D. V. H., "Thermostatic regulator for heating apparatus." Jan. 28.
1883.—Macnaughtan, W. C., "Joints for pipes." Jan 28.
1909.—Lymn, A. H., "Gas-producers." Jan. 28.
1915.—Schäfer, H., "Cutting off the gas supply from any part of an installation." Jan. 28.
1917.—Smith, B., and Harmes, E. C., "Incombustible incandescent fuel." Jan. 28.
1929.—Anis, E., "Joints of metal tubes," Jan. 28.
1959.—Beaumont, F. J., "Prepayment meters." Jan. 28.
1994.—Keith, J. and G., "Gas-lamps." Jan. 29.
2057.—Akt.-Ges. für Selas-Beleuchtung, "Double mantles." Jan. 29.
2069.—Minnitt, H. T., "Bunsen burners." Jan. 29.
2116.—Ries, H., "Tar condensing apparatus." Jan. 30.
2145.—Koppers, H., "Gas-furnaces." Jan. 30.
2207.—Livesey, G., "Burners for liquid fuel." Jan. 31.
2210.—Owen, C. M., and Berryman, W., "Joining flexible metallic tubing to gas-fittings." Jan. 31.
2240.—The British Cerofirm Company, Ltd., "Mantles." A communication from the Cerofirm-Ges. m. b. H. Jan. 31.
2263.—Scott-Snell, E., "Carburettors." Feb. 1.
2285.—Bray, J. W., "Inverted burners." Feb. 1.
2286.—Bray, A., "Acetylene burners." Feb. 1.
2300.—Andrews, R. E., "Lighting by gas." Feb. 1.
2314.—Philipp, F., "Determining the calorific value of gases." Feb. 1.
2330.—Kampf, W., "Inverted mantles." Feb. 1.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

West Ham House Illumination Eccentricities.

Sir,—I do not know whether you would think it advisable to publish in your columns a few remarks, by a biassed electrical man, on the editorial note in your issue for the 28th ult., with reference to the letter which appeared under the heading of "Gas and Electricity in West Ham." But I notice that you preface the column containing it with a statement disowning responsibility for opinions expressed; and I write in the hope that, in common fairness, you will publish this letter.

To give you the information for which you ask, and which, by accidentally discovering your correspondent's name, I have gleaned—

1.—The lights installed are 30-candle power Osrams, except one which is 50-candle power.
2.—The voltage is 100. (This on our circuit is a matter of no importance, for transformers can always be used, to bring the voltage to any figure desired.)
3.—The average time for retiring is 10 30.
4.—The meter is correct.

The average burning hours for the different rooms in this class of house throughout the year are as follows:—

	At 3d. per Unit.
Dining Room.—One 50-candle power Osram lamp 6.30 to 10.30 = 4 hours = 200 watts. . . . . =	0·600d.
Hall.—One 30-candle power Osram lamp, 7.30 to 10.15 = 2¾ hours = 84 watts. . . . . =	0·252
Kitchen.—One 30-candle power Osram lamp, 6.30 to 9 = 2½ hours = 75 watts. . . . . =	0·225
Allowing 1½ hours per night for bedrooms, occasional use of drawing room, landings, &c., one 30-candle power Osram . . . . . =	0·135
Total	1·212d.
From this, deduct 10 per cent. for lights not used during yearly holidays, and visiting times . . =	0·121
Total per day	1·09d.

This is as near as possible 7⅛d. per week.

I think the figures given as to burning hours cannot be regarded as rigidly economical, but represent fair average conditions. You are distinctly wrong in your statement that each 30-candle power Osram lamp takes 38 watts. The average lamp takes 30 watts, measured on a Kelvin watt-balance test. Further, neither your correspondent nor any other man, short of a lunatic, puts all his lights on at lighting-up time, and burns them throughout the evening. Again, your correspondent states that he has at least as much light as before. He has told me that this is a very mild way of putting it; the fact being that he has 25 per cent. more, so far as he can judge. He also says that he had good gas mantles and fittings.

The whole of the figures given by gas companies in comparisons of light-giving power are stated in candle power, and not in candle-feet, whereas it is the latter measurement that really matters to the light user, and is the basis on which light is judged by him; and whatever your quoted professors may state will not alter his opinion, backed up in this case by actual experience in both forms of lighting.

As to the last few words in the editorial remarks, I shall be very happy to give you full information in June next.

H. H. Holmes,
Sales Manager, West Ham Corporation Electricity Supply.
Stratford, E., Feb. 1, 1908.

[Our correspondent need not have wasted time over the preface to the essential part of his letter; the information in that part being sufficiently interesting as an illustration of the ludicrous prescription of electrical people for house illumination, to warrant publication. Our previous correspondent "A Shareholder in Both Electric and Gas Companies" apparently retires from the correspondence, and leaves Mr. Holmes, as Sales Manager of the West Ham Corporation Electricity Supply, to do the best he can with a statement of a case that showed we had to deal with an ultra-economist, or one who had a meter that was out of condition for accurate measurement. If our former correspondent is prepared to corroborate Mr. Holmes's specification of average burning hours as applying to his case (Mr. Holmes having merely constructed a sort of hypothetical lighting-hour schedule), then our first surmise is the correct one. It is the old story of niggardly and miserable treatment on the part of electricians to bring the cost of electricity down to something in line with incandescent gas lighting; and Mr. Holmes sets that treatment forth in all its naked truth for the ridicule of lighting engineers who have a preference for a house brightened by a generous supply of artificial light at a cheap rate. If Mr. Holmes as "Sales Manager" can get consumers to be satisfied with a specification such as he presents here, why should he be, to use a colloquialism, worth his weight in gold as a canvasser to the West Ham Electricity Department. We cannot imagine what manner of houses and quality of occupants are content with this scheme of lighting. It is a class of house we are told in which one so-called 50-candle power lamp is allowed in the dining-room for an average of only four hours per day (from 6.30 to 10.30). Then we have the amusing fact—this is truly electrical—that the hall is permitted to indulge in an average of 2¾ hours' lighting per day—7.30 to 10.15. Now if the dining-room requires a light on an average from 6.30 to

10.30, why should the hall be left in darkness for on an average an hour later in the day, and why should the trouble be taken by the householder to extinguish the hall light on an average fifteen minutes before he does his dining-room light? Usually the hall light is the last one on the ground floor of an ordinary house to be extinguished. But these are extraordinary houses, and apparently extraordinary people who live in them, and who turn customs and comforts topsy-turvy to oblige purveyors of electricity. But to proceed with our examination into this remarkable instance of domestic economy, it is seen that the kitchen is permitted an average of one light from 6.30 to 9. Nine o'clock to bed for the poor maid! This must indeed be paradise. But still the maid must not pride herself that this is due to any consideration for her interests; on the contrary, it is due to another most praiseworthy cause—the curtailing of the expense of electric lighting. Then it is observed that only one-and-a-half hours' lighting per day is allowed for all sorts of things. It is the total lighting time set apart for distribution among the bedrooms, within which time all the occupants of the house must scramble to bed, and leave sufficient remainder for the occasional use of the drawing-room, the landings, the lavatories, the scullery, &c.; and, mark this, divided among these several uses is only one 30-candle power lamp! Not satisfied with this beggarly amount of illumination, Mr. Holmes has the boldness to deduct from his estimate of expense 10 per cent. "for lights not used during yearly holidays and visiting times." Is there no other deduction that can be made in defence of our former correspondent's figure of 7d.? Existence must be miserable in a house illuminated as is this one. What does it all come to? That the householder and his family must huddle up in one room all the evening with a nominal 50-candle power light. They cannot be expected to share the kitchen with the maid; and they might feel a draught sitting in the hall. We differ from our correspondent that a nominal 50 or 30 candle power Osram lamp only uses 1 watt per candle power per hour. The tests of authorities that have been published show otherwise; and the metered consumption of a substantial installation of these Osram lamps in daily use has also convinced us to the contrary, beyond a shadow of doubt. The testimony of the meter in daily use has proved that consumptions such as we took on p. 225 of the "JOURNAL" for Jan. 28, of 58·42 watts per nominal 50-candle power Osram lamp and of 38·41 watts for a nominal 30-candle power lamp, are not unfair. The absurdity of Mr. Holmes's lighting timetable, and our disagreement with him as to the watts per hour per lamp that he has taken, would make further pursuit of present figures altogether unprofitable. We cannot accept the contradictory statements of our former correspondent that, with his present system of lighting, he has "at least as much light as before," and that he then had "good gas mantles and fittings." If he had good gas mantles and fittings, and they did not give more light than single 50 and 30 candle power Osrams, then they must have been greatly neglected. The gas company will no doubt be pleased to show him quite ordinary single incandescent gas-burners that will put the so-called 50 and 30 candle power Osrams out of the running. If the gas company can show these, why should not "A Shareholder in both Electric and Gas Companies" have had them?"—ED. J.G.L.]

LEGAL INTELLIGENCE.

THE PROMOTION OF THE KENT COUNTY GAS COMPANY.

Bankruptcy Court Proceedings.

A public inquiry was opened on Monday last week at the London Bankruptcy Court, before Mr. Registrar HOOD, into the promotion and failure of the Kent County Gaslight and Coke Company, Limited, against which a winding-up order was made last February upon the petition of shareholders.* The accounts filed under the liquidation showed total liabilities of £5559 (unsecured £4913), assets valued at £8693, and a deficiency of £20,281 to the shareholders.

Mr. H. BROUGHAM, Senior Official Receiver, conducted the inquiry. Mr. RITTER, Mr. ALLAN RAMSAY, and Mr. EDMUNDSON appeared for witnesses; and Mr. C. H. THORPE (instructed by Messrs. Corbould-Ellis and Mitchell) represented creditors and shareholders.

Mr. BROUGHAM stated that the witnesses required to attend were Messrs. Harry Warwick Gyde and Walter Darby (the promoters and vendors), Mr. Charles Archer (a Director), and Mr. Alfred Boulton (the Secretary). A medical certificate had been received from Mr. Boulton, who was too ill to be present; and, under these circumstances, his attendance would not be pressed.

Mr. *Gyde* was the first witness. In answer to Mr. BROUGHAM, he stated that he was connected with the promotion of the Company, and was one of the vendors of the property to Mr. Archer, who was the Trustee to the Company. When negotiating for its acquisition, he was carrying on business at No. 5, Lothbury, E.C., under the style of Darby and Co. Since the formation of the Company, he had traded as Walter Scott and Co. at No. 21, Great Winchester Street, E.C. He entered into negotiations in 1905 to acquire the gas-works at Goudhurst. An option was obtained in August, 1905; a formal offer was made in October, 1905; and by a deed, dated March 13, 1906, they acquired the property for £2350. The agreement was between (1) the Goudhurst Gas Company, Limited, the original owners of the property; (2) the Tunbridge Wells and District Finance Investment Company; (3) Mr. E. Robb; (4) Messrs. Vidler and Sons; (5) Mr. Jesse Hyde, as executor of the late Mr. James Hyde; and (6) Messrs. Harry Warwick Gyde and Walter Darby. On April 12, 1902, an agreement was made between the Goudhurst Gas Company and Mr. Hyde, granting the latter a lease of the works with the right to carry on the business for five years at £40 per annum. They also gave him an option to purchase the works and freehold for £1150. Witness did not recollect who introduced him to Mr. Hyde. They were advertising for properties about that time, and bought these gas-works as a private speculation, intending to work the concern themselves. After carrying on the business for a month or two, they sold it to the Kent County Gas Company, because they saw there was room for development. Mr. G. T. Harrap, whom they regarded as an experienced man in gas matters, made a report upon the property; and it was set out in the prospectus. Asked upon what basis they fixed the purchase price of £2350 paid to Mr. Hyde, witness said they thought the price was cheap, and agreed it upon their own responsibility. He did not know at the time that Mr. Hyde held an option to purchase the property from the Goudhurst Gas Company for £1150. Having acquired the property, they soon afterwards proceeded to form a Company to take it over. They went down to the neighbourhood and obtained the opinion of the residents, with the result that it was subsequently reported that nearly the whole of them had signed a requisition agreeing to take gas if it was brought past their doors. The prospectus was drawn in their office by a clerk. Witness did not suggest the name of the Kent County Gaslight and Coke Company, Limited, nor did he remember by whom it was suggested. Probably it was Mr. Hyde. An advertisement was put in the papers for a Director who understood gas; and in response they obtained the services of Mr. S. B. Darwin, Assoc.M.Inst.C.E., as Chairman of the Directors. Another Director, Mr. R. Reynolds, was witness's brother-in-law.

Mr. *Archer* at this stage entered the Court and took Mr. Gyde's place in the witness-box; Mr. BROUGHAM intimating that he would resume that gentleman's examination later on. In answer to questions, witness said he was a Director of the Company and acted as Chairman from May 19 to Aug. 8, 1906. He was also the Trustee for the Company under the purchase agreement. Previously he had been in business as a wine, spirit, and provision merchant, and had had no connection with a gas company. The Kent County Gaslight and Coke Company, Limited, was registered on May 2, 1906, with a capital of £50,000, to acquire from Messrs. Gyde and Darby, trading as F. C. Lawson and Co., the gas undertaking at Goudhurst. Witness had known Mr. Darby for five years prior to the formation of the Company; but he had no previous knowledge of Mr. Gyde. The first Directors were Mr. S. B. Darwin, Mr. J. Llewellyn Burgess, and witness. Mr. Burgess died in November, 1906. Acting as Trustee for the Company, witness agreed to purchase the undertaking on April 7, 1906, from F. C. Lawson and Co., who were described as of Cranbrook, gas-works proprietors. The purchase price was £21,800, payable as to 20 per cent. in cash on the adoption of the agreement, and the balance in cash or shares at the option of the vendors.

Mr. BROUGHAM: So that Messrs. Gyde and Darby were to receive £21,800 for the property they acquired for £2350, or, in other words, they were to make a profit of 800 per cent. on the transaction.

Witness pointed out that under the purchase agreement the vendors had to pay the expenses of forming and registering the Company, and were under other liabilities.

Mr. BROUGHAM took witness through the statements in the prospectus in order to test their accuracy, and elicited the admission that, although he acted as Trustee for the Company he did not previously see the property, or take any steps to satisfy himself that £21,800 was a fair price for it. He asked if it was a *bonâ fide* undertaking, and was assured it was. He also saw Mr. Harrap's report. When he signed the agreement, he did not know how much Messrs. Gyde and Darby had paid for the property. The prospectus was dated May 14, 1906, and invited subscriptions for the whole of the preference and ordinary capital. It stated that the list would open on the 15th of May and close on or before the 21st of May, and that the minimum subscription on which the Directors would proceed to allotment was 50 per cent. of the amount offered. He had not then seen an article in the "Financial Times" reviewing the prospectus; nor was his attention drawn to it a fortnight or three weeks later.

Mr. BROUGHAM: After the article had appeared, were not letters and telegrams received from persons who had applied for shares, and who wanted to withdraw their applications?

Witness: Only a few up to the time of allotment. The minute-book would show them.

Previous to the allotment there were 17 withdrawal applications, I think?—Yes.

Examination continued: A meeting of the Directors was held on May 19 at the offices of F. C. Lawson and Co., very short notice of it being given. Witness there overheard some discussion, wherein Mr. Darwin raised a question of resigning his seat on the Board.

Mr. BROUGHAM read a letter from Mr. Darwin complaining of the manner in which his name had been used in the prospectus, and asked witness whether he did not see a letter published in the papers on the 22nd of May, setting forth that he had resigned his position.

Witness replied that immediately after the letter was published, they took legal opinion as to whether the resignation could be enforced, and were advised that it could not. On May 28 they had received letters from numerous shareholders cancelling their shares, on the ground that Mr. Darwin, the Chairman, had resigned. They went to allotment on May 19, when applications for shares to the value of £16,385 had been received from the public. Two of the Directors put in applications for over £9000 worth; thus making up the minimum subscription. After they went to allotment, proceedings were taken by shareholders for rectification of the share register; and they were decided against the Company.

* See "JOURNAL," Vol. XCVII., pp. 352, 412, 545.

By Mr. THORPE: That was his first experience of company promotions, and he thought it would be his last.

Mr. RITTER, on behalf of the witness, objected to a question relating to his past history.

Mr. THORPE said it was most essential for the Court to know something of the witness's past. This promotion was not an isolated instance of misfortune, but was part of a system in which the two vendors had been engaged for a long time. It was quite necessary to ascertain whether the witness was merely a dummy or something worse.

Acting under his Counsel's advice, witness declined to state why he gave up his previous business in Surbiton; and the question was not pressed. He admitted that, as a business man, he would not have parted with £21,000 odd of his own money without making the fullest inquiries. He knew he was dealing with public money; but then he was not acting alone. He had co-Directors, and made all inquiries that he thought necessary at the time. Mr. Darby, whom he had known for five years previously, offered him the directorship of the Company. He knew nothing of Mr. Darby's financial position, but looked upon him as an ordinary successful man of business. Just before he joined the Board, witness learned that Mr. Darby and Mr. Gyde were trading as Lawson and Co.; but he did not know of their existence as Darby and Co. or as the City of London Investment Corporation. He presumed that Mr. Darby invited him to become a Director because he looked upon him as a man of ordinary business experience. He regarded it as an act of friendship on Mr. Darby's part. Counsel remarked: "He was doing you a good turn, and consequently you were grateful to him?" The reply was inaudible; but subsequently witness said he did not think his friendship with Mr. Darby might reasonably do away with his responsibilities to the shareholders. Prior to joining the Board, witness knew nothing of Mr. Gyde's past history, nor was he aware of the fact that Mr. Gyde was an undischarged bankrupt. Looking back, he thought it would have been much better had he made further inquiries. He did not go down to Goudhurst until June, when all the money had been parted with; and he admitted that had he seen the place earlier he would not have agreed to part with the money.

Mr. THORPE: In fact, you realized that it was an uncommonly bad bargain for the Company, and that you had made a very serious mistake with other people's money.

Asked why, under the circumstances, he consented to go to allotment on the 19th of May, though the list did not close until the 21st, witness said he did as he was asked by Mr. Darby and Mr. Gyde. They knew he had no experience of company-promoting details. Mr. Gyde was the moving spirit in connection with the affairs of the Company.

At this stage the proceedings were adjourned.

On the resumption of the inquiry on Tuesday,

Mr. THORPE continued his examination of Mr. Archer. Witness admitted that Messrs. Barnes and Bernard, the Solicitors to the Company, did not communicate to him or to the Directors the details with regard to the purchase of the property.

Mr. THORPE: Which was bought by Messrs. Gyde and Darby for so small a sum, and sold to you as Trustee for the Company at a very large profit.

Witness agreed that Messrs. Barnes and Bernard were set out in the prospectus as Solicitors to the Company. They were selected by the promoters and formally appointed by the Directors. He remembered the letter from Mr. S. B. Darwin relative to that gentleman's resignation. It was brought to his notice by Mr. Burgess, by means of a newspaper cutting, on May 29. It was not a fact that he parted with any of the Company's money after hearing that certain of the shareholders had applied for a return of their money. Certainly he paid out £10,000 to the promoters on the 28th of May; but at that time they were legally advised that Mr. Darwin's resignation could not be effective. He saw a letter, dated the 15th of June, in which Mr. Darwin repeated that he resigned office at the meeting on the 19th of May. The statutory meeting of the shareholders was held on the 17th of August. The whole Board of Directors was responsible for drawing up the circular convening the meeting, and he believed Mr. Gyde was present at the time.

Mr. THORPE: Do you justify leaving Mr. Darwin's name on as a Director?

Witness: Yes. I should think it was bearing out our Solicitors' advice that he had not legally resigned.

You raised no protest?—No. We also discussed the matter with Mr. Gore-Browne, who agreed with the Solicitors.

Examination continued: An official report of the meeting was sent out to all the shareholders; but the whole of the correspondence that had taken place with Mr. Darwin was omitted.

Mr. THORPE: Why?

Witness: I relied entirely on our Solicitors' and Counsel's opinion.

And the circular stated: "If the undertaking is given a fair chance, the anticipations of the prospectus should be fulfilled"?—Yes.

You had parted with over £21,000 to the promoters—practically the whole of the money that had been received. What was your reason for sending out this report? Was it to keep the shareholders quiet, and to prevent them taking any further action?—Not so far as I was concerned.

Was it that you intended to raise more money from the public?—We intended to go on.

Can you point to a single act of your own, when a Director of the Company, where you put the interests of the shareholders before those of the vendors?

Mr. RITTER objected to the question.

The REGISTRAR remarked that the witness had practically admitted that he was under the thumb of the promoters.

Mr. THORPE repeated the question.

Witness: Yes. I was very concerned, after I had parted with the money, about the guaranteed interest payable on the ordinary and preference shares, and I did get the necessary amount deposited at the bank.

Mr. RITTER elected to postpone his re-examination of the witness until the close of the inquiry.

Mr. *Gyde* was then recalled, and further examined by Mr. BROUGHAM. He stated that he entered into the agreement of April 17, 1906, with Mr. Archer for the sale of the property to the Company under the style of F. C. Lawson and Co.; but in the agreement of March 13, 1906, under which he acquired the property from Mr. Hyde, he was described as Darby and Co.

Mr. BROUGHAM: Who invented the name of "F. C. Lawson and Co., of Cranbrook, in the County of Kent, Gas-Works Proprietors"—you or Mr. Darby?

Witness: I cannot say; there was nothing in it.

Why didn't you stick to Darby and Co.?—In order not to clash with our London business.

Examination continued: The promoters agreed to guarantee the payment of a dividend for the first year on the ordinary and preference shares; also to provide the promotion expenses, which were estimated at £3500, but amounted to considerably more.

Mr. BROUGHAM: Did you ever tell the purchasers—that is to say, the Directors—how much you paid Mr. Hyde for these gas-works?

Witness: No.

The amount was stated in the deed of March 13, 1906?—Yes.

And that deed was referred to in the agreement of April 17, 1906?—Yes; but I did not know it at the time.

You told Mr. Archer that the property had cost you a considerable sum of money—over £10,000?—Yes, and so it did, including the expenses.

Mr. BROUGHAM next referred to the prospectus. Witness said it was prepared by his clerk; but he personally accepted responsibility for the statements therein. It was placed before the Directors in draft, discussed in his presence, and a number of alterations were made. It was dated May 14, 1906, was issued to the public at his firm's expense, but through the London Share Debenture Corporation. He gave instructions for it to be advertised in the Press; and it was fully advertised. Mr. Darwin's name appeared as Chairman, not only on the front page, but in the fold and the body of the prospectus. It was also set forth in a letter included with the prospectus, but sent out only at Mr. Darwin's directions to the shareholders of a Company in which that gentleman was interested. No fees were paid to anyone for the appearance of his name on the prospectus; but he believed Mr. Collis, the broker, received £100, which was returned as subscription for shares. Mention was made in the prospectus of various Gas Companies at Eastbourne, Tunbridge Wells, Canterbury, and elsewhere.

Mr. BROUGHAM: Do you suggest there could be any comparison beween the Goudhurst Gas Company and those mentioned in the prospectus?

Witness: Certainly I do.

What is the comparison?—I believe that forty years ago the Mitcham Gas Company started with——

Mitcham is not mentioned in the prospectus. Please let us keep to that document.—A gas company may be only worth £300 to-day, but advance to the value of £300,000.

But tell me how any one of the seven Gas Companies referred to in the prospectus can be compared to the Goudhurst Gas Company?—They are not put as a comparison, but to show what gas companies pay.

Do you know as a fact that these seven Companies have statutory powers?—No.

Will you take it from me that they have?—If you say so.

Have the Kent County Gaslight and Coke Company any statutory powers?—No.

In further examination, witness admitted that he had seen the ground on which the gas-works stood, and that it was about one-eighth of an acre in extent. There was, he pointed out, adjacent land which, if they kept quiet, they could acquire at their own price. He did not know that Mr. Stern, the owner of the adjoining land, had declined to sell the property, or that, in fact, he had ever been asked to do so.

Mr. BROUGHAM: You further say in the prospectus, "Goudhurst is the largest parish in England"?

Witness: We were informed that it is.

You know that the surrounding property is nearly all agricultural?—I was told that it contained many mansions of a similar character to that to which we supplied gas to the amount of £100 a year.

Within what radius of the works were these mansions?—I should think four miles.

Do you know there are not 100 houses within a radius of three miles of Goudhurst?—I do not know that.

Did you notice that the principal land was agricultural land?—My attention was drawn to the estates.

The residences were somewhat scattered?—Yes.

Then you say that "residential accommodation, in addition to offices, is provided at the works for the manager?"—Yes.

Did you give instructions for this accommodation to be built, and that it was simply an iron shed?—Iron and wood.

Was it erected before this prospectus was issued?—I believe it was. We gave instructions to the manager to have it erected to his liking, because he was going to sleep in it, and has done so.

Was its cost £5 10s. 10d.?—I was under the impression it cost £20 to £25.

The REGISTRAR: How many rooms were there in the shed?

Witness: One, divided.

Mr. BROUGHAM: Then the prospectus says, "By the extension of the service to many important districts in the immediate neighbourhood;" and it proceeds to name 14 places?—Yes.

Are not these places generally small hamlets, farms, private houses, or a cluster of cottages?—I have never heard of that.

You also say that requisitions agreeing to use gas as soon as the mains were laid had been signed by a very large number of the inhabitants of these districts?—Yes; the prospectus does.

Do you know that a number of the signatures to the requisitions were by people in Horsmonden and Lamberhurst, both of which towns were already supplied by a gas company?—No.

Why did you mention such places as Tunbridge Wells and Canterbury in connection with the Goudhurst Gas Company?—The prospectus was drawn up by a clerk in the office.

Was it fair to mention these towns in connection with Goudhurst?—Yes; in view of the prospects that gas-works have.

You knew that Goudhurst was a small village?—The actual village is not so large as many others I have seen.

You knew that the population was under 2000?—Yes.

Then did you think it fair to compare that village with such places as Tunbridge Wells and Canterbury?—Yes; it was pointed out to me that opposite the gas-works was a house taking over £100 worth of gas and also using the electric light; that there were many similar mansions in the neighbourhood, and that the penny-in-the-slot system was very much in favour with the working class for cooking purposes.

A discussion ensued upon the omission from the prospectus of the profit made by the promoters; Mr. Brougham submitting that the omission was very material in the present instance. He further asked leave to read from the judgment of Mr. Justice Joyce in relation to the prospectus, for which witness was responsible. The Registrar did not allow the judgment to be quoted, but added that he was well aware that his Lordship held a very hostile view in the matter.

Mr. Brougham (to witness): Were you aware of the article that appeared in the "Financial Times" on May 16, reviewing this prospectus unfavourably?

Witness: I did hear of it, but I never take any notice of those reviews.

Were many letters and telegrams received from persons withdrawing their applications for shares?—I believe some telegrams were received; and I understood they emanated from the "Daily Mail."

A meeting of the Directors was called for Saturday, May 19, at 12.15?—Yes, by the Secretary at the request of the Directors.

Was that meeting called in consequence of this unfavourable article?—Certainly not.

Did you see Mr. Darwin at the meeting?—No.

Did he tell you that he intended to resign?—He said he thought of resigning.

Did he decline to attend the meeting?—Yes.

And left the building?—Yes.

He took no part whatever in the meeting?—No.

The only Directors present were Mr. Archer and Mr. Burgess?—Yes.

Did you at that meeting proceed to allotment?—The Directors did.

Did you tell them they must go to allotment that day?—Certainly not.

Examination continued: The agreement was that the Directors should not go to allotment under the minimum subscription of 50 per cent. of the nominal capital, or £25,000. The public had subscribed £16,385; and Mr. Burgess and Mr. Reynolds applied for £9000 worth of shares—thus making up the minimum. These two Directors acted as nominees of witness and Mr. Darby.

The shares were taken on their behalf, and they paid for them. This was after it had been ascertained that the public subscription was insufficient for the allotment. Mr. Reynolds became a Director on May 22, 1906; and on the following day the promoters applied for £4360—being the amount of the deposit due to them under the purchase agreement. Cheques were drawn as follows, and were not crossed: No. 50 or bearer, £1360; No. 51 or bearer, £2000; No. 52 or bearer, £1000.

Mr. Brougham: Why were these cheques drawn to a number and to bearer instead of to F. C. Lawson and Co.?

Witness: I don't know; the Directors must have given instructions for them to be drawn in that way.

You know that Mr. Archer has said that the Directors gave no such orders, and that the cheques were drawn before the meeting?—In some instances (cheques for fees, for instance) they were.

At whose request were these cheques so drawn—your own?—No.

Did it surprise you?—No; I have seen thousands of cheques drawn in that manner.

On the 28th of May, three cheques, amounting to £10,000, were paid to you on account of the purchase price?—Yes, and we subscribed for £9000 of shares. The cheques were for £3000, £3000, and £4000 respectively, and were all paid into the account of F. C. Lawson and Co. at the Charing Cross branch of Williams Deacon's Bank. Then on the 11th of June the Company's seal was affixed to the conveyance, and cheques for £3000, £3000, and £1444 were drawn and treated in like manner.

Did you receive the proceeds of all these cheques?—No; we paid thousands of pounds away to Horncastle's, the advertising agents.

Mr. Brougham called attention to the fact that only 5s. per share was paid on the application for the £9000 worth of shares by Messrs. Reynolds and Burgess instead of 10s. paid by other subscribers; and he asked the reason for the reduction.

Witness said he knew of no particular reason except that the amount was large.

Could you have paid the amount out of your own money?—Easily.

On the 26th of August the Secretary wrote to shareholders offering to sell certain preference and ordinary shares at £4 12s. 6d. per share, "the holder being in urgent need of cash." Were they your shares?—Yes.

Were you in urgent need of cash?—Always—to buy businesses with. I think everybody is who wishes to develop his business. On the 3rd of September telegrams were sent out to the persons who had not replied to the letters, stating that there were twelve preference and ten ordinary shares left, for which "the holder would accept £100, or any offer for them." This was one of the plans of the Secretary; and the letters and telegrams were sent out from the Company's offices, but at witness's expense.

Although the telegrams suggest that only twelve preference and ten ordinary shares were left, you had hundreds then on hand?—Very likely; we have hundreds left now, unfortunately.

Mr. Brougham: Fortunately for the purchasers, I should say.

Examination continued: As a result of the letters and telegrams, 28 persons subscribed for 256 preference and 211 ordinary shares, for which £1987 18s. 4d. was received and paid to their (witness and Mr. Darby's) account in the ordinary way.

Mr. Brougham: That was in addition to the purchase price which you had already received?

Witness: It was for some of the shares for which we had paid 20s. in the pound.

In addition to the cheques for £21,800 purchase consideration, you had this £1987 18s. 4d. for the sale of shares—total £23,787 18s. 4d.?—It does not work out like that, but like this: Purchase of the property, £2350; promotion expenses, £4215; guaranteed interest (about), £800; paid for shares, £9000. That makes a total of over £16,000, and there was another £1000 expended in getting the signatures to the requisitions and small improvements at the works.

How was the net profit divided between you and Mr. Darby?—Under our partnership arrangement, Mr. Darby was to receive one-third and I the other two-thirds.

Mr. Thorpe: How long have you known Mr. Darby?

Witness: Five or six years.

Where did you first meet him?

Mr. Ritter objected to the question as being outside the scope of the inquiry.

Mr. Thorpe: I think it is very material, your Honour, to find out how these two people came to be connected with each other.

Witness said he first met Mr. Darby through a personal friend of both of them at Brighton. He could not recollect the name, and appealed to Mr. Darby, who also was unable to call it to mind. Asked if he was introduced to Mr. Darby with a view to a partnership, he declined to answer any question with regard to Mr. Darby that related to anything outside the Company.

Mr. Thorpe submitted that he had the right to ask something about the previous promotions of Messrs. Gyde and Darby, who, as he was prepared to show from Mr. Gyde's own lips, if the questions were allowed to be put, had been conducting business under a system whereby they purchased properties at rubbish prices and sold them to the public at very large profits. They were brought to the Court on some sort of suggestion of fraud; and, that being the case, it surely was necessary that he should be allowed to ask questions in order to show the principle on which they traded.

The Registrar felt that he could not allow the inquiry to go outside the Company's transactions and affairs.

Mr. Thorpe: Very well, your Honour. (To witness:) As a final question, I ask whether you absolutely refuse to answer any questions about your transactions in partnership with Mr. Darby prior to the formation of this Company?

Witness: I will only answer such questions as relate in any way to our dealings with this Company.

Then if I ask you any question about your partnership with Mr. Darby that relates to the period between 1902 and the formation of this Company, you refuse to answer?—Certainly I do.

Very well, now I know where I am. We will come to the formation of the Kent County Gaslight and Coke Company, Limited. At the time of promoting this concern, had you any reason to doubt the stability of Mr. Darby's financial position?—None whatever.

You looked upon him as a man of solid means, and able to carry out his financial transactions?—Yes.

At the time of bringing out this Company were you still an undischarged bankrupt?

Mr. Ritter: Surely, Sir, that has nothing to do with the promotion of this Company.

The Registrar: I am not so certain of that. (To witness:) Let me ask you this: Were you in a sufficiently strong position to carry out this undertaking?

Witness: Certainly I was, Sir.

Mr. Thorpe: You are described in the agreement of April 17, 1906, as "F. C. Lawson and Co., of Cranbrook, in the County of Kent, Gas-Works Proprietors." Why of Cranbrook?

Witness: We had an office at Cranbrook, which is very convenient to Goudhurst, and we could go over and see the works while the negotiations for purchase were proceeding.

You looked at the property in the distance, and regarded it as your own?—We were negotiating for its purchase.

Then you traded on hope?—We paid a deposit on the purchase; but when the lawyers got together we thought we should never be finished. In answer to further questions, witness said that about the time of the formation of the Company they were trading in London as Darby and Co. and as F. C. Lawson and Co., and were also Directors of the City of London Investment Corporation.

Why did you trade in different names?—I will tell you. It was because during the 25 years that I have been in business I have paid away huge sums for advertisements. In one year I paid as much as £28,000 in that way. If it became known that I was connected with a promotion, I was inundated to such an extent with applications—some of which did not stop short of blackmail—to put in advertisements in sometimes rotten papers, that I have paid sums such as £50 or £100 for advertisements to be put in papers not worth that [snapping his fingers]. That is the sole reason why I have done it all my life; and I should do it again to-morrow—again and again.

What previous experience had you of gas-works?—I have viewed some thousands of properties, including a number of gas-works.

Were you connected with the promotion of the West Suburban Gas Company?

Mr. Ritter objected to the question, and it was not pressed.

Mr. Thorpe: Let us come to the point of your guaranteeing the payment of the first year's interest on the preference and ordinary shares. If you were an undischarged bankrupt at the time, would you see anything unsatisfactory in assuming the guarantee of a dividend for the first year to the shareholders?

Mr. Ritter again objected to the question.

The Registrar: Let me put it in this way: Were you in a position to guarantee the dividend?

Witness: Absolutely.

Mr. Thorpe: And yet you describe yourself as being in urgent need of funds?

Witness said so was anyone carrying on a business with a desire to develop it. Asked if he had promoted successful companies, he said he had certainly promoted some successful concerns, while others had not proved to be so. Some years ago he promoted a company for which the Bank of England received the subscriptions, and still acted as bankers of the company.

The re-examination of this witness by Mr. Ritter was postponed.

Mr. *Walter Darby* was the next witness. He stated that his full name was Walter Scott Darby, and that he was a co-promoter and co-vendor in this case. He had previously carried on business for some years at Cardiff.

Mr. BROUGHAM: Were you an undischarged bankrupt there in 1894, and are you still undischarged from those proceedings?

Mr. RITTER again objected.

Mr. BROUGHAM explained that the question was necessitated by the fact that the freehold land had been conveyed to the promoters of the Company; and if they were both undischarged bankrupts, the question of title would probably have to be raised.

Witness admitted that he had not been discharged from the bankruptcy proceedings.

Mr. THORPE: Is it admitted that Mr. Gyde is still an undischarged bankrupt?

Mr. BROUGHAM said he had no reason to doubt the fact, as it was a matter of record in the Court files.

In answer to further questions, witness said the title of the Kent County Gaslight and Coke Company, Limited, was suggested by the late Mr. Hyde. He could not give any reason for calling these works by such a high-sounding name; but Mr. Hyde suggested it, and they accepted, it.

Mr. THORPE intimated that he did not wish to examine the witness; and the sitting was then adjourned to the 17th inst.

ACTION FOR TRESPASS AND ASSAULT.

In the King's Bench Division of the High Court of Justice last Wednesday, Mr. Justice Darling and a Special Jury had before them an action brought by a Mr. Mitchell and his wife against the Metropolitan Water Board, the High Bailiff of the Greenwich County Court (Mr. C. Pitt Taylor), Mr. J. W. Taylor, and Mr. W. Temple, to recover damages for trespass and assault. The plaintiffs, who are tenants and occupiers of No. 26, Ballina Street, Honor Oak Park, alleged that on the 14th of November the two last-named defendants, acting on their own behalf and that of the other defendants, wrongfully broke and entered the house, and, without lawful excuse, threatened to distrain upon the goods contained in it, and assaulted the female plaintiff by pushing her against the wall. It appeared that a Mr. C. W. Manley, a former clerk in the service of the Board, in 1905 resided in the house, and, having left his water-rate unpaid, an action was brought against him in the Westminster County Court and judgment recovered for £2 6s. Afterwards a warrant was issued and sent to the Greenwich County Court to be executed upon Manley's goods. The allegation against the Board was that they indicated to the High Bailiff that these goods would be found at 26, Ballina Street, though Manley had left the place, and been succeeded by the Mitchells. The last two defendants entered the house, and thereby occasioned a severe shock to Mrs. Mitchell. The Board denied liability, and said that if the other defendants had done any unlawful act, it was not by their authority. For the remaining defendants, it was contended that the entry was made in pursuance of the Bailiff's duty, and in obedience to the command of a warrant duly put into his hands for execution; also that the entry was peaceable, quiet, and regular. Reliance was likewise placed upon the provision of the Public Authorities Protection Act, 1893, section 1, sub-sections *c* and *d*.

Mr. Low, K.C., and Mr. H. A. M'Cardie appeared for the plaintiffs; Mr. Eldon Bankes, K.C., and Mr. A. B. Shaw for the Board; and Mr. Charles Doughty represented the other defendants.

The Jury found that the Board gave to the High Bailiff directions amounting to instructions to levy execution at 26, Ballina Street; and that the Bailiff's officers had done more than was necessary to execute the warrant, inasmuch as they had not satisfied themselves that Mr. Manley did or did not live in the house before their entry. They fixed the damages against the Board at £50. Against the High Bailiff and Taylor they did not give any damages; but in the case of Temple they fixed them at £5. After some discussion as to the way in which judgment should be entered, the Jury altered their verdict as follows: Damages against the Board, £50; against Taylor, one farthing; and £5 as between the High Bailiff and Temple.

On Thursday, the case was again before the Court for further consideration. Mr. Low, after referring to the finding of the Jury, said it was extremely doubtful whether there was any power to split up the damages between the Bailiff and his assistants; and he suggested that the judgment should be entered as follows: £50 against the Board and £5 against the other defendants. But then arose a difficulty. The payment into Court by the three defendants was a joint one, and therefore could not be available by either of them severally. The High Bailiff had paid in jointly for himself and his two assistants 40s, so that the amount would not cover them all. Mr. Doughty admitted that the payment-in was not sufficient. His Lordship said he should enter the verdict according to the finding of the Jury. Mr. Low asked for a certificate that it was a proper case to bring in the High Court. Mr. Doughty contended that the High Bailiff ought not to have been made a party to the action, as he was merely fulfilling his duty in executing the warrant. His Lordship said he had no doubt the whole difficulty had been brought about by the Board. There was no grievance calling for joining the Bailiff; the case could have been tried perfectly well against the Board alone, and the damages awarded by the Jury showed that there was no real justification for joining the other parties. Therefore he should not make any order, but allow the ordinary rule to apply.

The Typhoid Outbreak at Malvern.—Last Tuesday, the Malvern District Council unanimously adopted a recommendation of the Legal Committee to appeal against the judgment entered by Mr. Justice Lawrance in the action brought against them by Dr. Fergusson, of the Malvern Hydropathic Establishment, under which plaintiff was awarded £7500 damages, as reported in the "JOURNAL" last week.

THE WATER SUPPLY DIFFICULTY AT EXMOUTH.

Miller's Claim to Compensation.

At the Exeter County Court on Wednesday and Thursday last, an action was tried before His Honour Judge Lush-Wilson and a Jury, in which the question at issue was the right of the Exmouth District Council to abstract water from a stream known as the Yettington or East Budleigh Brook. The plaintiffs were Messrs. J. H. & J. James, occupiers of a mill, part of the water power for which is derived from this stream.

It was stated by Counsel for the plaintiffs (Mr. Hawke) that in 1892 the then Exmouth Water Company obtained parliamentary powers which enabled them to take certain water to supplement the supply. It was, however, laid down in the Act that, in order to protect the mill and the people of East Budleigh, and ensure them being supplied with water, a reservoir should be constructed with a capacity of 12 million gallons. As a matter of fact, a reservoir of only about 10 million gallons capacity was made. In 1900, the District Council took over the powers of the Company; but no addition was made to the sources of water, and last year serious difficulties arose. The supply was curtailed; and the Council sent a fire-engine to the Island Plantation—a long way from their intakes and the area provided for in the Act of 1892—and pumped the water through hose into the pipes supplying the town. This was continued for about a fortnight; and though the plaintiffs could not tell the exact quantity of water abstracted, witnesses would say that it could not have been less than 2 million gallons. On the question of damages, Counsel submitted that it did not matter in the least whether this abstraction caused the plaintiffs injury; and in support of this contention he quoted the case of *Roberts v. Gwyfrai District Council*, in which the late Mr. Justice Kekewich had held that a local authority were not entitled to take water from a stream without the written consent of the person concerned, and that such person was entitled to bring an action to maintain his right quite irrespective of the question of damages. In the present case, the plaintiffs suffered loss because, as a result of the pumping, they had merely a trickle of water, and the mill could be worked only four or five hours a day.

In support of his case, Mr. Hawke called Mr. George Beavis, who for many years was Manager of the Water Company. He stated that the compensation reservoir was much smaller than was provided for in the Act of 1892, and early in September last, when there was great shortage of water in Exmouth, the water in the reservoir was 7 inches below the overflow. He calculated that the pumping affected the flow of water to the plaintiffs' mill to the extent of 50,000 gallons a day. A number of witnesses were called to give evidence as to the effect of the diminished flow upon the mill.

For the defence, Mr. Harris contended that there was no interference by the Council, by their pumping operations, with the rights enjoyed by the plaintiffs. By the Act of 1892, the compensation reservoir then authorized was to belong to, and be under the control of, the owner of the Rolle Estate, and the plaintiffs were entitled to only so much water as the owner of the estate gave them through the valves of the reservoirs. At the time the pumping commenced, the reservoir was 5 inches below the overflow-point; and during the pumping operations a larger quantity of water was let out than defendants took from the stream.

Mr. Samuel Hutton, the Surveyor to the District Council, stated that the quantity of water pumped from the stream was 520,000 gallons; and compensation was given by a small valve below the reservoir, which made good what was taken. Witness admitted, in cross-examination, that things were in a serious state as regards the water supply of the town at the time the pumping took place.

His Honour said he was clearly of opinion that the defendants had no right to intercept this water. The Council were undoubtedly in a difficult position; but this did not affect their liability to a person they might injure in relieving themselves of it.

The Jury, while appreciating the necessity for the action the Council took, found that they did interfere with the plaintiffs' rights, and assessed the damages at £15—a sum which the Judge characterized as liberal compensation.

Disturbance at the Dronfield Gas-Works.

At the Eckington Petty Sessions, on Monday of last week, James Steele was charged with unlawfully wounding his brother Charles, on Jan. 19, and also with doing damage to the amount of £5 15s. 6d., by breaking windows at the Dronfield Gas-Works. Charles Steele, the prisoner's brother, said that James lodged in a house on the gas-works; and on the date named witness went to see him as he had heard he was ill. Prisoner had worked for him; and when he got to the house they had some words, and the prisoner struck him. He retaliated; and James, taking off his coat, picked up a carving knife which lay on the table, and said he would show who was the boss. He cut the gas-bracket off, throwing the place into darkness; and there was a scuffle, in the course of which witness was injured on the arm. His brother had been in the Army, but was discharged, as he was considered to be mentally deficient. Some twelve years ago he was placed in an asylum. Police-constable Harris deposed to being called to the scene, and having to bring prisoner to the police station on a charge of being drunk and disorderly. Prisoner was committed for trial at the Derbyshire Assizes. In the second case, a stoker named Bates said that prisoner with a rake smashed all the windows in the engine-room and fitting-shop, and the glasses of the street-lamps outside. Mr. T. B. Jones, the Manager of the works, estimated the damage at £5 15s. 6d. Prisoner was committed for trial on this charge also.

Heavy Sentences for Thefts from Gas-Meters.

At the Birmingham Sessions last Tuesday, the Assistant-Recorder (Mr. Soden) passed a sharp sentence on Richard Millichamp, a labourer, who pleaded guilty to breaking into a house and stealing 6s. 6d. from a gas-meter. Mr. Sandilands, who prosecuted, said the

prisoner had undoubtedly been leader of a gang who were engaged in this class of theft, of which there had been an extraordinary number in the city. Sergeant Wright said the prisoner and his associates got their living by stealing money from gas-meters. Witness had known of as many as eleven or twelve meters in succession being robbed in one street. The Assistant-Recorder said that, though the prisoner was only 23 years of age, he had been convicted seven or eight times, and was one of the chief offenders in the robbing of slot gas-meters. This class of crime was largely on the increase in the city, and he thought those who managed the gas undertaking might adopt some measures to protect their property a little more. This, however, was another matter. It was his duty to pass a severe sentence on the prisoner, and he would be imprisoned for two years with hard labour, and two years' police supervision. In the case of William Jones, another prisoner charged with stealing from slot gas-meters, Detective-Superintendent Daniel said it was the man's boast that he lived in this way. He had been living a life of crime for fifteen years, and had served one sentence of three years' penal servitude. Mr. Soden said the public must be protected against this class of criminal, and prisoner would be sentenced to three years' penal servitude.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following progress has been made with Bills:—

Bills presented and read the first time: Ammanford Urban District Council Water Bill, Audenshaw and Saddleworth Urban District Councils Bill, Briton Ferry Urban District Council Bill, Huddersfield Water Bill, Keighley Corporation Bill, Llanelly and Burry Port Water Board Bill, Monmouthshire County Council Bill, Ravensthorpe Urban District Council Bill, Skegness Urban District Council Bill, Swansea Valley Gas Bill, Wath-upon-Dearne Urban District Council Gas Bill.

Bills presented, read the first time, and referred to the Examiners: Bognor Gaslight and Coke Company Bill, Llanelly Gas Bill, Pontypridd Water Bill, Rhymney and Aber Valleys Gas and Water Bill.

HOUSE OF COMMONS.

Wednesday, Feb. 5.

Municipal Ownership of the Irish Gas-Works.

Mr. DEVLIN asked the Chief Secretary for Ireland whether his attention had been called to the fact that since the Belfast Corporation took over the local gas-works in 1874 a sum of £155,400 had been handed over out of the profits in aid of local rates, that the cost of gas was only 2s. 3d. per 1000 cubic feet, and that the profits for the year ending March, 1907, were £70,000; and whether, in view of the success of municipal ownership of the gas supply in Belfast, he would direct the Local Government Board to circularize Irish urban authorities, pointing out the advantages of such ownership.

Mr. BIRRELL replied that the Board had not sufficient information at their disposal to verify the figures given in the question. Assuming, however, that the facts were substantially as stated, the Board did not consider it desirable that they should act upon the suggestion contained in the concluding part of the question. The steps which might be taken for the lighting of urban districts was a matter for the consideration of the urban authorities themselves, who would doubtless learn from the publicity given to the honourable member's question that the municipal gas undertaking had proved successful in Belfast.

The following progress has been made with Bills:—

Bills presented and read the first time: Blackburn Corporation Bill, Burnley Corporation Bill, Bury and District Joint Water Board Bill, Conway and Colwyn Bay Joint Water Board Bill, Criccieth Water and Improvement Bill, Dublin and Central Ireland Electric Power Bill, Glyncorrwg Urban District Council Bill, Greystones Gas Bill, Holderness Water Bill, Leicester Corporation Bill, Lincoln Corporation Bill, Liverpool Corporation Bill, Manchester Corporation Bill, Margate Corporation Bill, Padiham Urban District Council Bill, Rochdale Corporation Bill, Slough Urban District Water Bill, Stockport Corporation Bill, West Bridgford Urban District Council Water Bill, Wolverhampton Corporation Bill.

Bills presented, read the first time, and referred to the Examiners; Blaydon and Ryton Water (Transfer) Bill, Bromley and Crays Gas Bill, Dartford Gas Bill, Derby Gas Bill, Draycott Gas Bill, Garw and Ogmore Gas Bill, Gosport Gas Bill, South-West Suburban Water Bill, Southwell District Gas Bill, Swinton and Mexborough Gas Bill.

A Bill "to limit the hours of work below ground in coal mines" has been presented by Mr. Jenkins, the Labour Member for Chatham; and it is to be read a second time on the 5th of June.

The attention of the General Purposes Committee of the Wimbledon Borough Council having been called to the fact that, under the Mitcham and Wimbledon Gas Act of last year, the Mitcham and Wimbledon District Gas Company were compelled to provide a testing-station on their property near Haydon's Road, within one year from the passing of the Act, and that the Council might, if they thought fit, appoint a gas examiner to test the illuminating and calorific power of the gas supplied by the Company, the Town Clerk has been directed to communicate with the Gas Examiner appointed by the Wandsworth Borough Council, with respect to his making periodical tests on behalf of the Wimbledon Council.

MISCELLANEOUS NEWS.

GAS COMPANIES' PROTECTION ASSOCIATION.

Coal Miners' Eight-Hours Bill.

A Special Meeting of the Association was held last Thursday, at the Westminster Palace Hotel, Victoria Street, S.W.—the chair being occupied by Mr. H. E. JONES, the Chairman of the Association—for the purpose of considering the advisability of approaching the Government on the question of the Coal Miners' Eight-Hours Bill.

THE ATTENDANCE.

The attendance-book registered the presence of Sir George Livesey, Mr. H. E. Jones, Mr. Frank Bush (South Metropolitan Gas Company), Mr. D. Milne Watson (Gaslight and Coke Company), Mr. J. H. Troughton (Newmarket), Mr. W. Mann (Brentford), Mr. W. R. Phillips (Luton), Mr. Stanley C. Sherrard (Kingston-upon-Thames), Mr. Phillip Allison (Louth), Mr. A. G. Snelgrove (West Ham), Mr. Hanbury Thomas (Sheffield), Mr. Thomas Douglas (Sidmouth), Mr. H. Prosser Turner (Lydney), Mr. B. R. Green (Mitcham and Wimbledon Gas Company), Mr. A. E. Broadberry (Tottenham), Mr. A. W. Brookes (British Gaslight Company), Mr. H. Townsend (Wakefield), Mr. Sydney Y. Shoubridge and Mr. C. M. Ohren (South Suburban Gas Company), Mr. John T. Jolliffe (Ipswich), Mr. C. S. Ellery (Bath), Mr. J. W. Helps (Croydon), Mr. A. E. King (Cambridge), Mr. E. Allen (Liverpool), Mr. G. S. Eunson (Northampton), Mr. R. O. Paterson (Cheltenham), Mr. W. E. Price (Hampton Court), Mr. G. Clarry (Cardiff), Mr. E. W. H. Eady (Southampton), Mr. A. G. Readdy (Hoylake), Mr. W. Belton (Shrewsbury), Mr. C. W. Offord (Enfield), Mr. J. W. Auchterlonie (Cambridge), Mr. D. W. Helps (Reading), Mr. G. O. Churcher (Gosport), Mr. C. W. Braine (Wandsworth and Putney Gas Company), Mr. F. Smallbone (Chigwell, Woodford, and Loughton Gas Company), Mr. A. W. Johnston (Brentford), Mr. T. May (Richmond), Mr. T. Berridge (Leamington).

APOLOGIES FOR ABSENCE.

The SECRETARY (Mr. F. E. Cooper) announced that he had received some letters of apology for absence. Mr. Corbet Woodall, the Governor of the Gaslight and Coke Company, regretted that he could not attend the meeting, and wrote: "I am in agreement with the proposal that the Association should send a deputation to the Home Secretary with the object of calling his attention to the influence the Bill will probably have on the price of coal. Apart from the general objection to legislating for a powerful body like miners, as if they were on a par with children employed in factories and needing protection, this legislation for the workers in one industry at the expense of the general community is clearly objectionable; and I hope the deputation will be able to satisfy the Home Secretary that it is so." Mr. Charles E. Botley (Hastings) and Mr. F. T. Cotton (Dublin) also approved of the action proposed to be taken; while Mr. T. Waddom (Newcastle-on-Tyne) and Mr. R. Hall (Matlock) regretted their inability to be present, but expressed no opinion on the matter to be discussed.

A STATEMENT BY SIR GEORGE LIVESEY.

The CHAIRMAN said the meeting had been called at the instance of Sir George Livesey and Mr. Corbet Woodall; and they could not do better than listen to what the former gentleman had to say in support of the recommendation he thought he was prepared to move—that the Association should send a deputation to the Home Secretary. The members had had a good deal of information already from Sir George, in the course of the interesting correspondence he had contributed to the Technical Press.

Sir GEORGE LIVESEY said that, on Jan. 8, the coal owners had a deputation to the Home Secretary, in opposition to the Miners' Eight-Hours Bill. They made out a very forcible case on the subject, based on the Departmental Committee's report, which showed that there was no doubt the Bill, if passed, would lead to a shortage in the production of coal. The Departmental Committee said that not only would it cause this shortage in the production of coal—only temporarily, they thought—but it would considerably increase the cost of coal-getting. A fortnight ago he met one of these coal owners, who asked him, "What are you gas people doing in this matter?" He (Sir George) remembered seeing an account of the deputation, in which Mr. Gladstone, the Home Secretary, expressed surprise that the users of coal had not made a move; and, reading between the lines, he was led to the supposition—and it was confirmed by what he had heard from other quarters—that Mr. Gladstone wished to hear what they had to say, and that any representation from coal users would be welcomed. Well, at any rate, he had to tell his questioner that the gas companies were doing nothing. The gentleman reminded him of what Mr. Gladstone had said, and went on to remark: "I have moved the steel makers. I am on both sides—coal and steel production." He added: "Whatever increased cost may be put on the coal, the coalowners will get it back." He (Sir George) had spoken to Mr. Corbet Woodall, who had assured him that the Gaslight and Coke Company would join in any movement of the kind proposed; and he had also approached Mr. Jones, who said the same for the Commercial Company. Then the question arose as to what form the action should take; and in conference with Mr. Woodall, it was agreed that the best course would be to call the Association together—that it was just the thing for the Association to take up. Hence this meeting. He might tell them that all other industries were moving now. The steel industry started it; and the railway companies were also active. At first, the idea was that there might be a joint deputation; but against this it had to be considered that there would be one principal speaker, and others would hardly have a turn. But this matter was settled definitely by the railway companies, who told him they intended to have their own deputation, as they were the largest aggregate coal users in the kingdom. He believed they had made up their minds to approach the Government. It was not likely the Government would receive

a large number of deputations; but if they could get their memorial in in time, the probability was that the Home Secretary would appoint a day for the reception of the deputations generally. Gas undertakings were somewhat in the position of the coal owners—if coal increased in price, they would put up the charge for gas. The strong point which he thought should he urged upon the Government was that they were being pressed by the Socialist Trade Unions to promote the Bill, but that the inarticulate millions should be considered. What were Members of Parliament for, if they did not look after the interests of those who could not speak for themselves? This Bill would hit the poor harder than anyone else. These were the points they could urge; and they could also urge that, though they would be able to raise the price of gas to meet the increased cost of coal, still they would be loth to do this, and that any increase in the price of gas would be detrimental to their own and the public interest. He thought they should have some little discussion before putting the resolution, the adoption of which he moved, disagreeing with any restriction of the hours of labour in coal mines.

A Discussion.

Mr. Hanbury Thomas (Sheffield) remarked that Sir George Livesey had dealt so exhaustively with the subject that there was not much left to say. There were, however, one or two points that might be forcibly put forward. One of these was that if the price of coal went up very much, it meant that the industries of the country would be handicapped in their competition with foreign countries, and the numbers of unemployed would be largely augmented. He thought the gas companies would be hit both ways. Not only would they have to pay more for coal; but when trade suffered, their business would naturally decrease with it. The collier seemed the spoiled child of the kingdom. He (the speaker) came from the North; and he could tell them the collier was not a man to be greatly pitied or sympathized with. They read of the terrible colliery accidents, which everybody deplored; and they all cheerfully paid something more for their coal in order that everything that could be done to prevent these accidents should be carried out. But it seemed that the Eight-Hours Bill would not have any effect in this direction. Then, again, miners did not work underground so very long; and, besides this, their own Unions were strong enough to bring about any changes in their condition that were required. (Hear, hear.) He thought each member might do something in his own town to stir up local coal users. Sir George had told them he had seen various people; and they were going to move. He (the speaker) had been in communication with the Chamber of Commerce in Sheffield; and they were calling a public meeting. If all the members of the Association would put themselves in correspondence with the local Chambers of Commerce where they existed, and in other cases with some influential men, it could not do any harm. This Bill was being forced upon the Government by the miners; and very few people in Parliament had raised any question against it, because, as they knew, Parliament was now very much on one side. He thought the Government would really like to have their hands strengthened in putting in any protection they could for coal users, by some opposition which would prevent the matter being altogether one-sided.

Mr. E. W. H. Eady (Southampton) said he had very carefully read through the proceedings of the last deputation to the Home Secretary; and it seemed to him that that gentleman rather threw out a hint that the question might be narrowed down to whether the eight hours should be from bank to bank, or whether it should be eight-and-a-half hours—allowing time to get to work. He thought the Association might perhaps find it better, instead of opposing the whole of the Bill, to assent to a compromise, and ask for the time to be fixed at eight-and-a-half hours from bank to bank.

Sir George Livesey pointed out that this would be admitting the principle of restricting the hours of labour of adult men who could take care of themselves. He had always found it best to ask for what one wanted, and not for what one thought he would get.

Mr. R. O. Paterson (Cheltenham), referring to the statement in the document sent out to members, that the Bill would mean a reduction of output, said he thought the answer to this on the part of the instigators of the Bill would be that the whole object of the Bill was to employ more labour—not that the production of coal should be reduced.

Sir George Livesey: The quotation in the document from the conclusions of the Departmental Committee says, "A temporary contraction of output, and a consequent period of embarrassment and loss to the country at large."

Mr. Paterson (continuing) said he was afraid it was not an argument which would carry much weight with the Home Secretary. They would be leading him to the argument that it would introduce more labour into the mines, and that the production would probably be increased, and not decreased. To his (Mr. Paterson's) mind, this was a point that should be brought before the Committee in preparing their memorial to the Home Secretary.

Sir George Livesey: I think it very likely what would affect us most would be the permanent increased cost of getting coal.

Mr. Paterson: That is the main point—not the effect upon the production.

Mr. H. Townsend (Wakefield) remarked that he came from a mining district; and at present coal owners were complaining of shortage of labour with the present hours. They all knew that there was a great deal of unemployment, and a large number of men out of work; but they were not the sort of men who would find jobs if the Bill passed into law. There was a great shortage of pit boys; and this fact predominated over the situation. The birth-rate was falling off; and that class of boy was not being produced. If it was expected that the Bill would relieve the unemployed, he believed it would be found to be an error. This was a point worthy of consideration.

Mr. E. Allen (Liverpool) felt sure they all appreciated the object of the Committee in calling this meeting. Anything touching the price of coal should have their serious consideration. The miner did not need any of their sympathy, because he was well able to take care of himself; and the difficulty, as regarded the Wigan district, was to get the men to work a reasonable number of days a week. If they would work six days of eight hours, it would be another matter; but to put in, as many of them did, two holidays in the week, reduced the output very considerably. One of his Directors was the Managing-Director of a large colliery; and he bitterly complained that their capital was not being employed. The output was very small; while standing charges, of course, remained the same. This meant a great loss. The attitude of the Association should be opposition to the Eight Hours Bill.

Mr. T. Berridge (Leamington) remarked that the proprietor of a Warwickshire colliery had told him the men only worked four days a week; and he had said that if he could get fifty more men, he would put them on at that moment.

Mr. H. Prosser Turner (Lydney) stated that, according to the evidence he had seen, the miners in the Forest of Dean were not themselves in favour of the Bill. It would press very unfairly on the older men as against the younger ones.

The Chairman said one point that had not been touched upon was the right of the man himself not to be trammelled by Parliament in respect of the number of hours he should work. Personally he had always been an advocate of long hours. There was no necessity at all for legislation, in face of the strong Unions that existed. There was no oppression of the working man. When he was a child and lived in a colliery district, the conditions were terrible. Then women worked in the mines with chains round their waists, and dragged the coal along. Much had since been done to ameliorate the condition of the miner. A great deal had come from the miner himself—through education. In mining towns on holidays, one would now see crowds of well-dressed men engaged in sports; and their homes were also more respectable. No doubt the operation of the Unions and combinations of the men, and their own personal influence, had been quite sufficient to render the conditions of their labour such as need not be distasteful or odious to any man. There could be no need, in a country like this, to have legislation to limit an adult man in the number of hours he might work. There was no occasion for it; and the men in many parts were not at all keen about it. The gas industry had got to depend upon a supply of coal on reasonable terms in order to advance their business, and give those facilities to the consumers, and especially to the working classes, which were so important; and they needed no other argument why they should intervene, and regard with a jealous eye anything that would restrict their coal supplies, even already, at times of full trade, sufficiently troublesome to obtain. Therefore, he thought there would be no difficulty in their passing the resolution, which was in the following terms:—

The Resolution.

"That this Association considers that any restrictions in the hours of labour in coal mines is unnecessary, and would be injurious to many industries depending on a supply of coal, and so far as the industry of gas manufacturing is concerned would lead to a certain increase in the price of gas," [he thought they might say it was "certain," because naturally coal was one of their first costs of production] "thus inflicting a hardship both on trade and domestic consumers of gas, and especially on the working classes, who at this time are largely dependent on slot-meter supplies for lighting, cooking, and heating by gas. And that we resolve to use all lawful means in opposing the said Bill; and that, further, we approach His Majesty's Secretary of State for the Home Department, asking him to receive a deputation of members of this Association, for the purpose of hearing the views of gas undertakings as to the effect of the said Bill upon the gas industry."

Mr. Hanbury Thomas seconded the resolution; and it was carried unanimously.

Some discussion then took place as to the appointment of a Committee to give effect to the resolution.

The Secretary suggested that he should send to all gas companies and corporations a report of the proceedings at this meeting, with a copy of the resolution; and that, having got their views, there should be a meeting of the Committee that might be appointed to decide how they should approach the Home Office.

Mr. L. W. S. Rostron said he had seen Mr. Ratcliffe Ellis, the coal-owners' representative, who said he was afraid the Bill would be introduced within the next few weeks, and there was no time to be lost.

Sir George Livesey remarked that they ought to communicate with all the gas undertakings. He was not sure that Mr. Ratcliffe Ellis's fear was altogether justified. The Government at present had quite enough on hand.

Mr. Milne Watson (Gaslight and Coke Company) suggested that the Committee of the Association should be appointed; and that the meeting should empower them to act as a deputation, and co-opt anyone.

This was agreed to; and it was decided that the companies to be communicated with should be those having a capital of £5000, and all local authorities owning gas-works.

The Rating of Gas Companies—The Ipswich Case.

Uniform Gas Testing—The "Metropolitan" No. 2 Burner.

The Chairman said they had to decide what was to be done in pursuance of the resolution moved at the last annual meeting of the Association by Sir George Livesey and seconded by Mr. Corbet Woodall, to consider what steps should be taken to promote a Rating Bill. Since they last met, they had had a very important decision in the Ipswich case, in which it was ruled absolutely—and he thought could never be controverted—that all the subject-matters upon which doubt had been thrown were not only not rateable, but afforded grounds for deduction as for profit on trade.

Sir George Livesey remarked that a Committee was appointed to carry out or to deal with the resolution passed at the general meeting; and this resolution was to consider whether a Bill could not be promoted by the Association for the purpose of putting the rating of gas-works on a more satisfactory footing. Since then, however, there had been the decision in the Ipswich case, which he thought rather altered the situation. The Rating Authorities were very cock-a-hoop about their idea that the slot-meters, fittings, and stoves should not be considered as tenant's capital. But the decision that had been given in the Ipswich case had settled this matter. It rather looked to him now as if it were advisable to let the matter rest, and for gas companies to press

as hardly as they could for rating on the present lines, because, as Mr. Jones had so clearly explained on more than one occasion, this large increase in the tenant's capital would tend to reduce the assessments of gas companies. Now that it was settled that slot-meters, &c., were tenant's capital, he thought they might "rest on their oars" for the present.

The CHAIRMAN: I quite think so.

Sir GEORGE LIVESEY (continuing) said there was another important matter. The Committee were also authorized to promote a Bill for the adoption of the Carpenter burner—the "Metropolitan" No. 2 burner—as the general burner for testing all over the kingdom. This he did say would be a very good thing. (Hear, hear.) The Brentford Company had got into some trouble lately through an obsolete burner. It would be a great advantage to have a definite standard for testing; and then they would know where they were. The Committee would have to consider whether to go on with this Bill, which he thought would be advisable; but the proposed Rating Bill, he took it, the meeting agreed had better be left alone for the present.

The CHAIRMAN said he should strongly urge the desirability of this. The pressing need for seeking for some remedy in rating matters had disappeared with the Ipswich decision; and he asserted, with all possible conviction, that had this decision been given before the recent appeal by a large Metropolitan Gas Company at Clerkenwell, it must have altered the conclusion that was come to by that Court. It could not have failed to have done so. That Court, unfortunately, gave no reasons—in fact it seemed to him they carefully abstained from giving reasons—for their decision; but it was almost impossible to conceal from anybody who was present during the whole of the hearing (as he was) that the opinion of the Court lay with the view that slot-meters, fittings, &c., which were of enormous value ought not to be excluded from rating.

Sir GEORGE LIVESEY: The Court almost said that.

The CHAIRMAN: Well, it was almost said; but the decision was given carefully guarded against a possibility of appeal. Continuing, he remarked that he thought they had now the remedy in their own hands. The authorities said: "Look at this rich business that you have been paying fat dividends on for many years; and now you say the landlord ought not to have the rent." But the business they were doing to-day was of a leaner kind than that which they used to do. It could only be done by loaning to the working classes, who could not afford to buy them, these meters, fittings, and stoves. A tenant of a gas-works could not do his trade unless he was allowed to carry it on in this way. If they had a property to let, they would let it to the man who would give most rent; and the only way for a gas company to secure the best rent would be by pursuing the business of selling gas for heating purposes at a low price. This being so, they had really the issue in their own hands very much now. All they had to do was to pursue their course of providing all the facilities they could to the largest number of their consumers, who were the working classes, and then claim for them. The Courts would allow them to claim now—he would not say 17½ per cent., but he thought it might be near it—and the Rating Authorities could not get away from it. Therefore he agreed cordially that the necessity for legislation had left them. The law was very simple. What would the premises (land and buildings, not meters) let at from year to year? It was, as he said, very simple, if it was applied faithfully; but of late years there had been the inclusion for rating of the slot-meters, &c., which had resulted in some disability, or some unfairness, to the companies. He thought, however, that they could now get all this straight. As to the other matter—the question of the burner—he did not take much alarm about the Brentford case, because for years he had been using at Wandsworth a burner with fifteen holes. He was satisfied that he could use a burner which complied with this condition so that it might give him a better result than the old steatite top Letheby argand of that date; and this burner had got crystallized into the Company's Act. He would rather have had the Carpenter burner; but he was not in time for it. He thought it was only right they should try to get the best standards for their industry. Of late they had got rid of some bugbears; and now they had this new burner to help them. If they wanted to sell gas for heating purposes, their way to do it was to have uniform testing by a uniform burner. They might very well promote a Bill; but he thought they should have, so as to show what was behind them, a resolution from the Institution of Gas Engineers asking them to take the matter up or offering to co-operate with them. It was essentially a point for scientific gas engineers, who had in their minds all the difficulties of making rich gas which it was not necessary to sell, but which was requisite for these antiquated burners.

Sir GEORGE LIVESEY said they should apply to the Board of Trade. It must be a Government measure; it could not be carried through by the gas companies. The Association at their meeting in October passed two resolutions—one relating to the Rating Bill, and the other to the Burner Bill; and they were both, if it was determined to go on with them, to be introduced this session—the Rating Bill through the Local Government Board, and the other through the Board of Trade. He thought they should try to get the Bill in now; it was no use waiting a year. Perhaps they could form a deputation.

The CHAIRMAN: Of course, they consider that in every town there is a sort of bargain struck when the Act is passed.

Sir GEORGE LIVESEY: But the Board of Trade have done the very thing for us in Southport. They have given the Carpenter burner. There was a bargain struck, and they have altered it. They have given the Carpenter burner without any concession to Birkdale. Their Act gave the Board of Trade authority to settle the burner. Continuing, he said he was in that matter, and attended at the Board of Trade with the Southport people; and Birkdale opposed. But the upshot of it was that the Board of Trade gave the burner without any concession to Birkdale. It was admitted at the Board of Trade last year that it would make a difference of 1½ candles. This being so, he thought they should go on with the matter this year.

The CHAIRMAN: There was a special stipulation in the Act.

Sir GEORGE LIVESEY: Yes; but the Board of Trade did intervene, and gave a burner which allowed Southport an advantage of 1½ candles, without any concession to Birkdale.

The CHAIRMAN: You mean that this shows sympathy.

Mr. BELTON (Shrewsbury) said that in his case the provision was, "or such other burner as the Board of Trade may approve;" and he thought it was so in most instances.

Mr. HANBURY THOMAS was of opinion that it would be a very good thing if they could get the Board of Trade to extend all over the kingdom what they had done for Southport. They would all be very glad of the change.

Sir GEORGE LIVESEY remarked that if once they got the assistance of the Board of Trade, they could then agree as to what would be the best way of bringing in the Bill.

Mr. D. H. HELPS (Reading): If we go to the Board of Trade, they may ask if we are unanimous; and all companies, unfortunately, do not belong to the Association.

Mr. TOWNSEND: The Bill would, I take it, over-ride clauses in the present Acts as to the standard burner?

Sir GEORGE LIVESEY: It would make a standard burner for the whole of the kingdom.

Mr. TOWNSEND: We should, then, be delighted if the Association could see their way to get such a Bill passed.

Mr. BERRIDGE: The resolution was passed at the last meeting; and I take it, unless it is rescinded, you will proceed in the matter.

Mr. PATERSON said the Cheltenham Company secured the Carpenter burner in 1906; and knowing the advantages of it, he was anxious to see all gas companies participating in the benefits to be derived from its use. What he felt as to the proposition before the meeting was that there was very little hope of their being able to persuade the Board of Trade to introduce a Public Bill standardizing the No. 2 burner all over the country, because there was a pecuniary value in the burner which must be admitted; and he thought the Board of Trade would be advised that a Public Bill altering legislation in Private Acts of Parliament in almost every town of the country, would be a very serious undertaking. But he was of opinion that the principle which the Association originated, under Sir George Livesey's wise suggestion, of getting companies under the sulphur clauses to combine to promote a Joint Bill, might be applied with very great advantage indeed to the case of the burner.

Sir GEORGE LIVESEY: That we cannot do till next year. But the Secretary suggests that our President (Sir Henry Kimber, Bart., M.P.) should introduce a Bill into Parliament, and try to get the Board of Trade to support it. There is no harm in that.

Mr. PATERSON added that they did not take any money value for the burner in the case of Cheltenham; but the Company were in Parliament in 1906. They were a maximum dividend, and not a sliding-scale, company.

This concluded the business of the meeting; and the members dispersed, after according a vote of thanks to Mr. Jones for presiding.

Suffocation by Coal Gas.

The Coroner for West Sussex investigated on the 1st inst. the case of the death of Lionel Dornton Duff, aged 19, a cadet qualifying for seamanship, living in the Brighton Road, Worthing. The previous Thursday, he retired just before eleven o'clock; and about an hour later a nurse in the house heard him breathing heavily. Usually he slept with a light burning, and with his bedroom door open; but the nurse found the door shut and the room in darkness and full of gas. A piece of india-rubber tubing, which had been used on a gas-stove, was attached to the gas-burner, which was turned full on. The youth was removed to another room, and artificial respiration tried for a long time; but death ensued from heart failure. Deceased suffered from a disease of the mitral valve; and the medical evidence was to the effect that very little gas would be fatal to anyone in his condition. He had had a severe attack of influenza, and this had left him very depressed. The Jury attributed the suicide to temporary insanity. Last Tuesday morning, Arthur William Dines, aged 59, a master mariner, of No. 9, Acland Street, Albert Avenue, Hull, was found dead in the front room, in which he had passed the night. There was a strong smell of gas, the chandelier being down and the taps turned on. Since September the deceased had been suffering from a paralytic stroke. An open verdict was returned at an inquest held at Southampton on Thursday on Mr. James Liston Black, the Managing-Director of the Dock Engineering Company, Limited. As the deceased had not been seen for two or three days, his house was entered, and his lifeless body was found on the floor of the smoking-room covered with a blanket and a quilt, with the head resting on two pillows, in front of the gas-stove, the taps of the burners in which were turned on.

Explosion through Defective Gas-Fitting.—In the Coventry County Court last Tuesday, before His Honour Judge Ingham and a Jury, an action was heard in which damages to the amount of £20 were claimed from the Shaw Bush Lighting and Engineering Company, as the result of a gas explosion, due, it was alleged, to defective gas-fitting work. The plaintiffs were Alfred Smith and Florrie Smith, husband and wife; and it appeared from the evidence that they took a house in which the gas was supplied to certain parts of the premises only, and an extension was required to other rooms, including two bedrooms. Mrs. Smith had occasion to go into a bedroom, and struck a match, when an explosion followed. Some of the ceiling was blown down, the furniture was damaged, and Mrs. Smith suffered considerably from shock. A local gasfitter, who had examined the joint, said he should not consider it was a proper one. Joseph Lucas, a gasfitter, said he carried out the work, and tested the joint afterwards for three-quarters of an hour. There was no leakage then. He saw the room after the explosion, and considered the boards had been taken up. The leak in the joint was accounted for by something heavy having been rolled over the floor, causing a fracture of the joint. Mr. Bush said he examined the joint, which was cleanly made. The break was probably due to the vibration of the floor. Mr. Maddocks, the Counsel for the defendants, submitted that there was no negligence on their part. The Jury found, however, that there was negligence; and they assessed the damage at £4. Judgment was accordingly entered for this amount.

THE GASLIGHT AND COKE COMPANY.

Proceedings at the Half-Yearly General Meeting.

The Half-Yearly Ordinary General Meeting of Proprietors—the 192nd—was held last Friday, at the Chief Office, Horseferry Road, Westminster—CORBET WOODALL, Esq., M.Inst.C.E. (the Governor), in the chair.

The SECRETARY (Mr. Henry Rayner), having read the notice convening the meeting, the seal of the Company was affixed to the Register of Proprietors.

The report and accounts, which have already appeared in the "JOURNAL," were taken as read.

THE GOVERNOR'S SPEECH.

The GOVERNOR: I have pleasure in submitting to you the report and accounts for adoption. At our meeting held a year ago, and again six months later, we were first anticipating and then realizing the heavy extra charges for coal and oil. I then deplored the postponement of our hoped-for reduction in the price of gas; but at the same time I pledged my colleagues and myself that there should be no increase in the charge, except under pressure of absolute necessity. In June, we had made our contracts for coal and oil; and we knew that, under these heads, we should have to pay a quarter-of-a-million sterling more than in the past year. It was with this somewhat alarming fact before us that we decided upon resuming the charge for meter-rents, with a condition attached that there should be no increase in the price of gas for at least a year from September, 1907. The rental to be derived from meter-rents was estimated at £60,000 per annum, or about 25 per cent. of the extra cost of coal. It was not until September that we made our contracts for coke and some other residuals. Following the lead of coal, the price of coke advanced heavily; and it is to that, added to the rental of meters, and the realization of certain further economies in working, that we chiefly owe our ability to reduce the price of gas. A reduction of 1d. per 1000 cubic feet sounds a small thing; but it means over £80,000 per annum of relief to the consumers of our gas. To me, it means more; it is a demonstration that the reorganization of the Company has been so far successful, and it is a happy augury for the future.

THE COMPANY'S VITALITY.

The fact of so striking a recovery having been made is fraught with much significance. I regard it as a sign of vitality in our undertaking—an indication of the existence of a power of continuous growth and development corresponding with the general progress of the community. The services we can render to the public are needed, and will be made increasing use of as people learn to reduce the superfluous laboriousness of housekeeping, and to appreciate brightness in their surroundings, both in and out of doors. It is for us to watch the course of these developments, which will go on to ends and by ways not at present foreseen.

TRAINING OF THE STAFF.

The lectures and instruction to the staff of the Chief Inspector's Department are continued, and are bearing good fruit. During the past year 1752 men attended one or other of the classes or demonstrations. Following on the same lines, we have decided to open workshops for the instruction of youths as gas-fitters, grounding them well in all that pertains to our special work for consumers. To these shops we will admit boys of good character from the County Council schools, and others who may be found suitable. After a course of training, they will be sent out as assistant-fitters; and they will have a future to look forward to in the Company's service.

ITEMS OF INTEREST IN THE ACCOUNTS.

There are, as usual, some features of special interest in the accounts. Although our output of gas does not increase rapidly, we are obliged to incur some expenditure on capital account. Our business, as you know, has changed materially in recent years. Of the consumers we have lost, many were users of large quantities of gas. Some of them we shall get back again; but in the meantime we have covered the loss by connecting a great number of small users, for whom we must, at a heavy cost, provide mains, service-pipes, stoves, meters, and fittings. Of these consumers through automatic meters, we have now 276,550. It may interest some shareholders if I mention that from them we collected last year 155 millions of coins, of a value of £647,000, and weighing 1336 tons; which means for each working day 500,000 coins, weighing 4½ tons.

EXPENDITURE ON WORKS.

You will see from the accounts that our capital expenditure on works was £18,000—against which there is written off nearly £16,000 for general depreciation. So that the net addition is only a little over £2000. Upon distribution plant, we have spent £58,000, and written off £31,000—the permanent addition being £27,000. Taking the whole year, the business has increased by 2¼ per cent., and the capital expenditure by one-fifth of 1 per cent. That a careful watch is kept upon the capital is further shown by the fact that, with the same rates paid, the total cost for dividends and interest is now lower, reckoned as a charge per 1000 cubic feet, than at any previous time in the Company's history.

ITEMS IN THE REVENUE ACCOUNT.

Looking next at the revenue account, I have already mentioned, and it is stated in the report, that the increased quantity of gas paid for is only 1 per cent. over the corresponding half year. Considering, however, the singular mildness of the month of December, during which the thermometer never fell to freezing point, a larger increase was hardly to be expected. I understand that we have not had so mild a December in London for 35 years. The increase in output, together with the higher price of gas on the south side of the Thames, enhanced our revenue by £25,000; while the meter-rents (which were only operative in the December quarter) yielded some £14,000—that is very nearly the amount we estimated. Our estimate was £60,000 per annum, and we have received £14,000 for one quarter. Stove-rental has, again, improved by £2000. Further economies have been effected in the cost of manufacture and purification, amounting to £15,000. We have spent more upon repairs and renewals of works. For this, I make no apology; the reasons why these expenses keep high have already been given from this chair more than once.

THE CONDITION OF THE WORKS.

Having visited all the stations of the Company within the past fortnight, I am able to confirm the reports of the Engineers that all are in excellent order and repair—the money has been wisely spent. The reduction of £20,000 in the item for repairs of mains and service pipes is due, not to savings in the account period, but to the accident that in 1906 there was a special charge of £15,000 under this head—being the balance of the automatic fittings account, which was then written off.

REPAIRS OF METERS AND STOVES.

The apparent large increase in the cost of repairs to meters and stoves (£21,000 and £5000 respectively) is due to the depreciation of this class of plant, which was commenced in January last. Prior to that time, all funds available for depreciation of distributing plant were devoted to the "Fittings Suspense Account." They were liberated by the final liquidation of that fund, and are now distributed over meters, stoves, and fittings. The whole of the £26,000 is included in the item of £30,800 in Account No. 3—"Depreciation of Meters and Stoves." I am glad to report that the discharge of the whole of the sea-borne coal for the up-town stations, as well as for Beckton, is now being effected without difficulty.

PREPAYMENT SUPPLIES AND ASSESSMENT.

During the last half year, a decision of a Divisional Court has settled an important question with regard to the rating of gas-works. The Recorder of Ipswich decided, *inter alia*, on an appeal of the Ipswich Gas Company, that the meters, stoves, and fittings hired out by the Company would not be provided by the landlord, but by the tenant, and were, consequently, not rateable. A case was stated by him to the High Court at the request of the Assessment Committee; and the learned Judges upheld the view of the Recorder. This settles one issue which, though clear in our opinion, had yet caused much controversy, and by so much strengthens the position of gas companies.

MANUFACTURING STATIONS.

The closing-down of several of the Company's manufacturing stations has naturally caused an increase in the demand upon Beckton. During the winter as much as 60 per cent. of the total daily supply has been drawn from this source. For many years it was customary to pump gas into the large mains leading from Beckton to London, and then to withdraw it—also by means of pumps or exhausters—from the mains and pass it into the gasholders. All the up-town pumping-stations—there were eight of them—have now been dispensed with; the pumps at Beckton doing all the work. The reconstruction of a part of the works at Nine Elms will be put in hand during the current year. We have several retort-houses at that station which have been idle for many years; and upon the site of these a new house will be built and equipped for the most economical production. Nine Elms will be able to make gas at as low a cost as Beckton, and is therefore the station where extensions will be most profitable. At Fulham also—the station furthest removed from Beckton—reconstruction on the same lines will be carried out. These works will be executed at the cost of revenue; involving practically no additional charge against capital. In the net revenue account it will be seen that the Directors have appropriated £10,000 to the insurance fund, as against £2500 in December, 1906. We have felt that this fund needed strengthening, and that a larger contribution was justified by the state of our finances at this time.

DIVIDEND AND PROSPECTS—COAL.

The result of the half-year's working is, after providing for fixed charges and setting aside £10,000 towards the redemption fund, a net profit of £376,575. Adding the balance brought forward from the June account—viz., £306,992—we have a sum available for dividend of £683,568. The Directors recommend a dividend at the rate of £4 8s. per cent. per annum, which will absorb £334,017, and leave £349,551 to be carried forward. From the 1st of January, and due to the reduction in the price of gas, the shareholders are entitled to an increased dividend; and it is the intention of the Directors to recommend it in due course. Notice was given in November last by "Coalite Limited" of a Bill to be promoted by them conferring powers upon the Company to open roads and lay down mains for the conveyance of gas to be used for power purposes only. The Bill was subsequently withdrawn; and it is therefore unnecessary to discuss the Company's attitude in relation to it. Six months ago, I expressed the opinion that the high price of coal would be maintained for but a short time. There are already indications that the return to more reasonable rates has commenced; and we may hope that our next contracts will compare favourably with the last. How far the fall in the price of coal has resulted from slacker trade, and to what extent the high price has contributed to the reduction of trade by increasing largely the cost of manufacture, it would be unprofitable to discuss here. We all hope that for some time to come the charge for coal may be maintained at a price which, while fair to the coal industry, will be not unreasonable to the users. We have commenced the current half year well, and can reasonably conclude that the financial results will be good. The improvements made are permanent. As a result, the position of the Company is encouraging; and I look forward to it with complete and entire satisfaction. With this feeling of confidence, I have great

pleasure in moving—"That this meeting do agree with and confirm the report of the Directors and the Auditors' report and statement of the accounts of the Company as transmitted to the proprietors on the 30th ult."

The DEPUTY-GOVERNOR (Mr. Howard Charles Ward): I have great pleasure in seconding the resolution. I think I have pretty considerable experience of the Company's accounts; and I never saw one so full of promise as that which is presented on this occasion. I consider it is due very much to the splendid work and ability of all the executive officers and our excellent Chairman.

REMARKS BY SHAREHOLDERS.

Mr. W. A. HOUNSOM said he should like for a moment to trespass on the time of the meeting in regard to the very lucid statement that had fallen from the Chairman, coupled with the statement of accounts and the report which they held in their hands that day. In doing so, he must go back to a meeting held some five years ago in that room. He was almost sorry to refer to it, and yet without doing so it was impossible to appreciate the position in which the Company now found itself. The shareholders would recollect the state of tension then—how the stocks of the Company had been knocked about; how, time after time, the Company had been thwarted in connection with parliamentary applications; how, on an application, a challenge was thrown down affecting the three Directors who retired by rotation; how the vote which was given gave the strongest indication of the feeling on the proprietors' side of the table; and how a moderate concession which had been asked for as to forwarding a report of the proceedings of the meetings from time to time to shareholders and which had not been yielded was then given. As he went away from that meeting, he well remembered a fellow proprietor saying to him: "It will do them good." He (the speaker) did not ask who the "them" were, and he did not say; but they understood one another. That was one of the most painful meetings he ever attended in the history of the Company in regard to its proceedings, or the proceedings of any of the companies which go to make up the great whole; it was regrettable. He was not there to allocate blame as to what led up to those proceedings. He dare say there was blame on that side of the table; but the principal part of the blame attached to those on his side of the table, who had deliberately, time after time, ignored the warnings which had been given—warnings which proved to be sadly true. And now they stood five years away from that time, and they had witnessed the most remarkable advance in the history of the Company. The old *régime*, which could be summed up from his side of the table—he was speaking among his fellow-shareholders, who had upon their shoulders the principal part of the blame—the whole history was almost summed up in the words of the poet, "Proputty, proputty, proputty." To-day they stood upon a different footing. They had seen, half year by half year, a steady, quiet, and persistent progress; and the progress had been on the basis of a pure business undertaking—an undertaking having duties not only to its shareholders and employees, but to the consumers, the customers of the Company. The result was shown in the magnificent figures to which the Chairman had just slightly alluded. These results ought, he thought, to have some word of appreciation from their side of the table. They ought to recognize the splendid work which had been accomplished by the Board—by those on the other side of the table. He only referred to them as the representatives of the great army which went to make up the employees of the Company. He felt certain there would be no word of discord from the other side of the table, and none from his fellow shareholders, if he said that their appreciation—their hope, he was going to say—was very largely centred in one, and that was in the occupant of the chair of the Company. (Hear, hear.) They owed a debt of gratitude to Mr. Woodall; and he was certain that those who associated with him so pleasantly would not challenge him when he said that they ought to express their thanks to him who was at the head of their affairs. There was that day a different atmosphere, an appreciative atmosphere, of the character of the business of the undertaking. The human element had come in, and now they were all working together to one end; and that was, for all of them the great whole. He thought the success of this year showed how all parties appreciated it after all. Day by day had gone by, and week by week, and those of them who had watched the technical journals and elsewhere had seen how the little things went to make up the whole—the things to which the Chairman had referred that morning, the education of the men, the facilities which had been given (facilities given, he understood, in that room, where Professor Lewes had had an opportunity of giving one of his wonderful discourses, and facilities outside) in connection with the staff, and the appreciation which had been shown by the different shop-keepers who had been told how to light their premises. Just fancy a great trading Company doing this! But it was by attention to small things that the position of a company was strengthened. As he had said before, he thought the blame rested very largely on their side of the table—there was an indifference, an apathy as to what was done, so long as a dividend was declared; and what took place five years ago had had a wonderful effect. He hoped there would be among the shareholders a more intelligent appreciation of the great obligations which the Company had, and the great debt they owed to those who had the management of the undertaking, and all in their employ. He hoped he should not be misunderstood at all in what he had said; but he felt that the time had come when there should be heard some word from their side of the table of the very hearty appreciation of the work which had been done. It had been a colossal work; they were regaining the position they ought to hold as the Premier Gas Company. They had lost it—it was no good mincing the matter—and they had regained it. Their regaining it would be the means, not only of strengthening the Company, but of consolidating their interests and bringing them into touch with all their customers on whom they depended for revenue. That day they had a wonderful achievement—a penny drop in the price of gas. He trusted it was only the precursor of a great deal more that could be done with; while at the same time the accounts showed how the Company had been strengthened. And, while the consumers were getting the benefit, they were ever looking forward to a greater permanent benefit, because of the progress in the manufacture of gas and the upkeep of all the stations belonging to the Company. He hoped his remarks at that stage would not be misunderstood.

Mr. R. H. GLEN said before the motion was put, there were two points, small in themselves but interesting both to the shareholders and consumers, he should like to name. Mention had been made of the Coalite Company, which recalled to him all the words they had heard and read about the new fuel. He remembered at that time the Gaslight and Coke Company came into the field also with a similar proposal, which he thought was called "Carbo." It would be interesting to know what the Company had done in this matter—what the application from the public had been, if the Company were still willing to offer Carbo, and if they thought it would lead to profit, or was it a matter they were going to let drop? Then, with regard to the re-imposition of a meter-rent, did the Company propose to maintain it for some years, or did they propose to abolish it within a short time, or as soon as possible? The accounts looked so prosperous, could the Directors hold out any hope to the consumers of abolishing the meter-rent? These were two points which the Chairman did not mention in his speech; and it would be interesting to the shareholders to hear something about them.

Mr. A. H. BAILEY asked if any explanation could be given as to the decrease in the number of public lamps.

The GOVERNOR: I should feel ungrateful if I did not, first of all, thank Mr. Hounsom for the very charming and eloquent words he used, and which I assure him my colleagues and myself value very highly indeed. I was particularly glad, although it may be regarded as a little exaggerated possibly, that Mr. Hounsom should have spoken of the responsibility for what may be called the somewhat backward condition of the Company at the date to which he referred—the responsibility resting with the shareholders. I do not know that the shareholders themselves were responsible; but I am quite sure that the Directors in their thought for the shareholders were responsible—that is to say, that there was more anxiety to maintain the dividend than was good for the permanent benefit of the Company. On that occasion—I have just had the report given to me—I myself made this remark: "The arguments which have been used with regard to the price of gas in its relation to dividend have been in some respects unwise. There are ways in which the profit of the Company may at times be used to greater advantage than in the payment of dividends. This is not a Company existing for a day or a year, but we hope for an indefinite time to come; and it is quite possible that the money divisible among the shareholders may be put to better use in consolidating the position of the Company than in the payment of the uttermost farthing that the shareholders are entitled to." I think that fairly represents the view that Mr. Hounsom put before us to-day; and I feel confirmed in my own view that it was sound by reason of his acceptance of it. The work has been hard during the five years that have intervened; but it has been made easy and pleasant to all of us on this side of the table by the unstinted devotion of the officers of the Company. I cannot express to the shareholders my complete satisfaction—"satisfaction" is a very poor word to express what I mean with the manner in which the officers throughout the undertaking have laboured in order to bring about the state of things in which we rejoice to-day. With regard to the question put by a shareholder, I may say that we are manufacturing Carbo, and are in fact using it. You see it burning in the grate in this room; but we do not find that the whole of the community are so very keen to buy a smokeless fuel of this kind. The manufacture is not increasing by leaps and bounds. That there will be a market for a certain amount of such fuel, I have no doubt; but there is not going to be the great industry that was foretold. With regard to meter-rents, they have certainly come to stay. (Hear, hear.) We felt that the abolition of meter-rents on the part of this Company, standing alone, was a mistake. Ever since the abolition of the charge, our Company has been compared with others who charge a meter-rent, to the detriment of our Company—people speaking of the 2s. 11d. price of last year, compared it with the price charged by other companies, forgetting that in that sum was included the charge for meter-rent. With regard to public lamps, as you are aware, the price of gas on the south side of the Thames is governed by the price charged by the South Metropolitan Company. The Gaslight and Coke Company, over their large area on the south side, charge the same rate as the South Metropolitan Company do. With regard to public lighting, we must charge for this the lowest rate that is charged to any private consumer. As the price of gas on the south side has gone up 3d., so our charge for public lighting has gone up the same amount.

Mr. BAILEY said he asked for an explanation of the decrease in the number of public lamps.

The GOVERNOR: That is due to electrical competition. We have lost a certain number of lamps; but we are holding our own fairly well in that direction. The large increase in revenue is due to the cause I have named.

The motion for the adoption of the report was then put, and carried unanimously.

THE DIVIDEND.

The GOVERNOR: I have now to bring up the following minute of the Court of Directors dated the 20th ult., which I will ask the Secretary to read.

The SECRETARY read the resolution, as follows:

> Resolved that it be recommended to the half-yearly ordinary general meeting of proprietors to be held on the 7th proximo (1) that the sum of £10,000 be set aside out of the divisible profits of the Company for the half year ending on the 31st day of December last towards the redemption fund, in accordance with the provisions of the Company's Act of 1903; and (2) that a dividend as follows for such half year be declared—viz., on the 4 per cent. consolidated preference stock at the rate of £4 per cent. per annum; on the convertible 5 per cent. preference stock at the rate of £5 per cent. per annum, on the 3½ per cent. maximum stock at the rate of £3 10s. per cent. per annum, on the ordinary stock at the rate of £4 8s. per cent. per annum, subject to deduction of income-tax.

The GOVERNOR: I beg leave to move the adoption of these recommendations.

The DEPUTY-GOVERNOR seconded the motion, which was put and carried unanimously.

RE-ELECTION OF RETIRING DIRECTORS AND AUDITORS.

The GOVERNOR: The Directors who retire to-day are Mr. John Miles and Sir Hugh Owen. I have now much pleasure in proposing the re-election of Mr. John Miles.

The DEPUTY-GOVERNOR seconded; and the resolution was carried unanimously.

The GOVERNOR: I have also the pleasure of proposing the re-election of Sir Hugh Owen.

Mr. C. M. EDWARDS seconded the nomination; and the resolution was carried unanimously.

Mr. J. REESON proposed the re-election of the retiring Auditors; and the motion was seconded and carried unanimously.

The GOVERNOR then announced that this concluded the business of the meeting.

VOTES OF THANKS.

Mr. HOUNSOM remarked that after what he had said, it would not be out of place if he moved a hearty vote of thanks. They all owed a great deal to having a united Board. He had already spoken of the Chairman; and they had others who were loyally backing him up in the efforts which had been so successfully made in the few years that had passed towards bringing the Company into its present position. He thought it would be their pleasure to give this vote of thanks in no half-hearted manner. In years gone by, he had been in that room when he was glad to get out of it when this vote had been put; but he hoped the vote would be seconded in no formal manner, and that it would be carried in the heartiest possible way.

Mr. REESON having seconded the vote, the resolution was put and carried unanimously.

The GOVERNOR: Ladies and Gentlemen, on behalf of myself and my colleagues, I thank you cordially. I have already said that it has been a laborious time during the last few years; but I can say that none of us have spared ourselves, and we rejoice as much, at any rate, as anybody here on the result. May I now propose that our heartiest thanks be given to the General Manager, the Secretary, the Chief Engineer, and all the Engineers and officers of the Company. I repeat that in no direction does one see any evidence of slackness. I am sure they are all hearty good friends together, and are working with true enjoyment for the success of our great Company.

Mr. BAILEY, in seconding the resolution, said it was something like 25 years since he began attending the meetings; but he had never been to one which had given him greater pleasure than this. They all looked upon it as being the result of the diligence of the staff in supporting the Directors.

The resolution was carried unanimously.

The GENERAL MANAGER (Mr. D. Milne Watson) said he should just like to say a word of thanks for himself and the staff for the extremely kind way in which the Governor of the Company had referred to them. He could assure them that the work was a pleasure in itself; and if anything were necessary or needed to add to that pleasure, it was the very hearty way in which they had passed the vote of thanks. It was a great pleasure to the staff to find that their work, humble though it might be, was so well recognized, and met with approval. He thanked the proprietors on behalf of himself and the staff.

The proceedings then terminated.

BRISTOL GAS COMPANY.

The Half-Yearly General Meeting of this Company was held last Thursday, at the Chief Offices, Colston Street, Bristol—Alderman J. W. S. DIX in the chair.

The SECRETARY (Mr. John Phillips) having read the notice convening the meeting, the report of the Directors, with the accounts for the six months ending the 31st of December, was presented. They stated that though the large increase in the price of coal had considerably affected the revenue account, they were pleased to report that, notwithstanding the liberal reduction made in 1906 in the price of gas supplied to large consumers and for power purposes, the revenue from this source showed a satisfactory increase. After paying the maximum dividend and the interest on debenture stock, including the interim dividend and interest paid to the 30th of June last, there remained a balance on the profit and loss account of £31,166 to be carried forward. They recommended the payment of a dividend for the half year at the rate of 5 per cent. per annum, subject to deduction of income-tax, on the nominal capital of the Company entitled to dividend.

The CHAIRMAN remarked that the accounts before the shareholders were very satisfactory indeed; and he would not be so hypocritical as to say that the Directors did not take some credit for the way in which the business had been done. Considering that coal had cost them from £19,000 to £20,000 extra, it was not a bad statement of account, especially as the price of gas had been reduced to the extent of £10,000. They were delighted to be able to give satisfaction and pleasure to their customers; and he thought they might take credit for it. Their electrical friends took all the credit for the reduction in the price of gas; but this was not worth disputing. So far as the consumer was concerned, he got the benefit of the reduction. Last year they increased in meters by 2905; and now the increase was 2495—so that it had not stopped. As far as prepayment meters were concerned, they showed that gas was getting into the houses of many who did not use it before. The additional prepayment meters were 2290, which was satisfactory. So far as cookers were concerned, they were 3363 last year, and 2790 this year, which was a very favourable increase on the whole. He ventured to think the time would come when most houses in the city, if not all of them, would have cookers. They had added 3½ miles of mains during the year. They had sold in the past twelve months 49 million cubic feet more gas than the preceding year—an increase of 2·66 per cent. This, compared with other gas companies, and considering the state of business generally, was very favourable. It was well to have the benefit of the incandescent light; but it rather reduced the output of gas. On the whole, the prosperity of the Company was satisfactory. They had had a great strain in coal; but if there should be anything like a fair reduction in the cost, they would be able to pull through the coal boom without increasing the price of gas. This would be a great satisfaction to the citizens and to themselves. He concluded by moving the adoption of the accounts.

Mr. G. K. STOTHERT seconded the motion; and it was agreed to.

The CHAIRMAN proposed the re-election of the retiring Director (Mr. J. H. Howell), and expressed regret at the loss by death of Mr. J. H. Lockley, one of his colleagues on the Board. He said the Directors did not propose to fill up the vacancy at present. For 49 years Mr. Phillips had had to do with the Company, and they could not dispense with his services as Secretary for the next twelve months, as they would be obliged to go to Parliament with a Bill to increase their capital. They could not elect him as a Director; but they wanted to keep the position open, and as soon as they could do so get him on the Board. By doing this they would secure his services and experience, which would be very much to the benefit of the Company.

The motion having been seconded and unanimously agreed to,

Mr. HOWELL, in acknowledging his re-election, emphasized what the Chairman had said in regard to the proposed election of Mr. Phillips as a Director. He said it must be of the greatest possible advantage to have a man on the Board who was so intimately connected with the business of the Company, from the smallest to the greatest detail.

The retiring Auditor (Mr. F. N. Tribe) having been re-elected, the dividend recommended in the report was declared.

A vote of thanks was then accorded to the Directors and officials, for the efficient way in which they managed the affairs of the Company.

The CHAIRMAN having briefly replied,

Mr. PHILLIPS acknowledged the resolution on behalf of the staff. He expressed appreciation of the great compliment which had been, and was to be, paid to himself, and testified to the cordial co-operation of all his brother officials.

The proceedings then closed.

YORK UNITED GAS COMPANY.

The Half-Yearly General Meeting of this Company was held last Thursday—Mr. J. R. HILL in the chair.

The SECRETARY (Mr. J. H. Hill) having read the notice convening the meeting, the report of the Directors was presented. They stated that in the six months ending Dec. 31 last, there had been an increase of more than 4½ million cubic feet in the quantity of gas sold by meter, compared with the corresponding period of the previous year; and that 1291 yards of additional mains had been laid, 384 meters put in for new consumers, and 554 cookers, 161 gas fires and boilers, and 2072 lights fixed. The Directors mentioned that Mr. S. E. Stevenson had resigned his position as Secretary, Manager, and Clerk of the Company, and that they had appointed Mr. J. H. Hill, who had been in their service upwards of forty years, to succeed him. The accounts accompanying the report showed that there was a sum of £8734 available for distribution; and the Directors recommended the payment of a dividend at the rate of 4 per cent. per annum on the preference and consolidated ordinary stocks (less income-tax) and the transference of £500 to reserve. This would leave £254 to be carried forward.

The CHAIRMAN, in moving the adoption of the report, remarked that there had been nothing of an unusual character during the half year to which it referred; and the result of the Company's operations must, he thought, be regarded as satisfactory. They claimed to have efficiently performed their duty of supplying light, heat, and power to the inhabitants of the city and neighbourhood at extremely low charges compared with those of other gas undertakings; and the stockholders would receive the usual dividend on their invested capital, while £500 had been added to the reserve fund. A set of retorts was in process of renewal; and, speaking generally, the machinery and plant had been kept in a proper state of working efficiency. Their new building in Little Stonegate had been completed, and proved to be a most satisfactory provision of the additional accommodation so much needed in the gas distribution and fitting departments. The exhibition held at the opening of the new premises furnished, as the Directors considered, strong evidence that the gas industry was holding its own; and, given fair play, it had nothing to fear from its younger rival, either on the score of efficiency or economy. In this connection, he had only one word to say, and that was to advise those who might be considering the claims put forward on behalf of electricity to be very careful to obtain complete and accurate information, and especially to have a fair and level basis of comparison before ever they abandoned the use of gas. The experience and advice of their officials was always available; and he was sure it would be found well worth while to consult them before experimenting with the newer form of illuminant. The only other topic he need touch upon was the change in their head official. Mr. Stevenson had resigned his position; and the Board had promoted Mr. J. H. Hill to fill his place, after a continuous and faithful service of upwards of forty years.

The VICE-CHAIRMAN (Mr. J. Melrose) seconded the motion; and it was carried *nem. con.*

In accordance with the Company's Act of Parliament, Mr. J. H. Hill was then formally appointed Clerk to the Company.

The dividends recommended in the report having been declared,

Major LINDBERG proposed that the best thanks of the meeting be tendered to the Chairman and Directors for the efficient manner in which they had conducted the business of the Company during the past half year. He said the shareholders were very much indebted to them for the way in which the undertaking was managed. As the Chairman had said, there was little of importance in the half-yearly report. The concern had, however, been efficiently carried on; and the shareholders would, he was certain, confirm in every way the appointment of Mr. Hill to the post of Secretary. He had been a good and faithful servant for many years, and had now justly obtained his reward. He hoped Mr. Hill would live many years to hold the position he now occupied.

Mr. G. WILSON seconded the motion; and it was carried.

The VICE-CHAIRMAN, in acknowledging the resolution, thanked the shareholders for the renewal of their confidence, and assured them it was the desire of all the members of the Board to do the best they could, not only for the shareholders, but for the city. He did not know of any undertaking of such magnitude that was carried on with greater economy or efficiency than theirs. Everyone interested in it endeavoured, to the utmost of his ability, to make the Company a success. It would be apparent to all that the public gas lighting of the city and also the private lighting had been wonderfully improved during the last few years; and wherever they could effect a permanent improvement, either in the manufacture of the gas or in the lighting, they had done so. It would be the constant aim of the Board to continue the progress of the Company, and make it a sure medium of investment as well as a means of good to the city.

NEWPORT (MON.) GAS COMPANY.

In proposing the adoption of the report at the half-yearly meeting of the Newport (Mon.) Gas Company last week, the Chairman (Mr. R. Laybourne) said that additional capital had been raised in consolidated and debenture stocks. This was necessary to pay off the bank overdraft; and it was fortunately effected before the high bank rate was declared, so that the money which would have been required to pay interest would be distributed among the stockholders in dividends. Referring to the revenue account, he said it would be observed that, though the cost of coal was much increased, the cost of manufacture during four months of the half year was less than it would have been, in consequence of the Board having exercised their option to increase the quantity to be delivered under old contracts. They would be able to pay the statutory dividends without raising the price of gas as many other companies had done. Coal cost £1100 more; but sales of gas produced only £450 more for the additional 3½ million cubic feet sold. The receipts from coke improved; but the revenue from other residual products was less. The demand for gas continued to improve; and 253 new services were fixed during the half year. The total number of prepayment meters in use was 9023; of cookers, 10,732; and of gas-fires, 3303. He had been asked why they did not supply more public lamps. His reply was that it did not rest with them, but with a higher power; and until they were allowed, they could not effect a saving to the ratepayers, which they would be pleased to do. The deposits of the Thrift Society worked in connection with the Company's employees, showed a satisfactory increase; and the sum at their credit was now £872. In addition to this saving, the Society had enabled the employees to invest in the Company's stock and other property to the extent of £1500. This was highly satisfactory to the Directors and all the men.

The report was adopted; and the usual statutory dividends were declared. In reply to a vote of thanks to the officials, Mr. Thomas Canning, the Engineer and Manager, remarked that the whole system of gas making and distribution had been modernized; so that more time and labour were required from the official staff. The Newport Gas-Works were in excellent condition, and were getting into the front rank of modern establishments.

WORKMEN AS DIRECTORS.

Interview with Sir George Livesey.

The announcement made in the half-yearly report of the South Metropolitan Gas Company, given in the "JOURNAL" last week (p. 281), that Mr. J. A. Butcher, who was elected a Workman-Director in 1898, and was three times re-elected by the workmen shareholders, had retired from the Company's service, and consequently from the Board, which was "a matter of regret to all the Directors," prompted a representative of the "Westminster Gazette" to call at the offices of the Company last Wednesday, with the object of obtaining details concerning the working of the co-partnership system. The following report of the interview appeared in our contemporary on Friday.

Asked if he had any comparative figures which clearly demonstrated the effect of the co-partnership system on the Company's wages bill, Sir George said: "Well, it must be remembered that the whole of the employees—clerks as well as workmen—are shareholders; and there are obviously no means of ascertaining the precise saving effected by the increased efficiency of the lamplighters, labourers, or clerks. But I think the carbonizing wages do afford a satisfactory test. The rates of wages, methods of working, and employment conditions in the retort-houses of three Metropolitan Gas Companies were practically identical from 1888 to 1893; and from figures taken from 'Field's Analysis' dealing with this period, the economical advantage of the system is clearly indicated. In 1888, the difference between the carbonizing wages paid by the South Metropolitan and the other two Companies per 1000 cubic feet of gas sold was very slight. In 1889 and 1890, the great strike sent up our wages bill 0·48d., and 0·14d. above the mean, for every 1000 cubic feet of gas sold. In 1891, however, when our profit-sharing system had been established two years, our carbonizing wages bill was 0·61d. below the mean—the conditions of the three Companies being still much the same. Thenceforward there has always been a considerable advantage in favour of this Company. In eight years we paid £820,000 for carbonizing labour, or £260,000 less that it cost the other Companies to make the same quantity of gas, or nearly 25 per cent. lower. The whole of this difference cannot, of course, be owing to co-partnership; but, allowance being made for all other possible causes, this great difference cannot be accounted for unless the beneficial influence of co-partnership is admitted. The experience of the last few years confirms us in our belief, often enough expressed, that in co-partnership lies the only true solution of the Capital and Labour problem."

The next question was as to how the men's wages compared with those paid by other gas companies; and to it Sir George replied: "Our men's wages are rather higher, and they get a fortnight's holiday in the summer, instead of the customary week. Moreover, in 1898, when stokers were scarce, the two co-partnership Companies—the South Suburban Gas Company and ourselves—were the first to give the increased wages necessary to secure the labour required. As to Trade Unionism, our opposition was withdrawn years ago; and we do not care whether the men belong to a Union or not, so long as they do their work well."

Views of the Workmen-Directors.

Sir George Livesey then invited the three Workmen-Directors from the adjoining Board-room to supply a few particulars of the working of the co-partnership system. There is a difference of a score of years in their ages, but little to choose between them with respect to the enthusiasm they display for the system which has brought them to the directorate. Mr. Henry Austen and Mr. H. T. Manley represent the workers—the one being a carpenter and the other an engine-driver. Mr. Austen has been on the Board nine years, having been elected by the ballot of the workmen shareholders four times—twice without opposition. Mr. C. T. Drumgold, the third Director, represents the staff of clerks, having been their Director for six years.

A smile of pleasure illumined the countenance of Mr. Austen, the veteran of the party, for he held in his hand a slip of paper which had just been given to him by the Registrar. "This shows," he said, "that the money available for the co-partnership dividend this year amounts to £5768, and that the amount of stock participating is £216,315. You cannot tell the pleasure we all feel in looking forward to this announcement; but over and above all is the satisfaction of knowing that we are partners in the business. Deputations of workers to state grievances? There is ample provision for any question affecting the men to be properly ventilated; but the complaints have all disappeared, and the foremen's duties are almost a sinecure."

"We all sit round the Board-room table every Wednesday," said Mr. Drumgold. "We each have an equal voice in the discussions; and if it comes to a vote, our power is exerted proportionately to that of the other Directors."

The Result of Co-Partnership.

The workmen sharing in this co-partnership business now number over 5000, and the market value of their collective holding amounted at the end of the year to £260,832. In addition to this, they have £58,295 on deposit and £28,600 invested in house property. Altogether, therefore, the 5000 employees of the South Metropolitan Gas Company have £347,727 at stake in the undertaking from which they earn their daily bread.

THE LIGHTING OF GREYSTONES.

Electricity Preferred.

Greystones, co. Wicklow, has been devoting some time to the consideration of the lighting question; there having been schemes for both gas and electricity presented. A Bill is being promoted in the present session for the establishment of a Gas Company in the district, which is now lighted by oil; while electricity has been suggested in another direction. A Ratepayers' Committee was formed, and a report was prepared in which three alternative proposals are set forth: (1) A scheme for public and private lighting by electricity, submitted by Messrs. W. Coates and Son, Limited, of Belfast and Dublin; (2) a scheme for public and private lighting by coal gas, submitted by Messrs. Anderson Bros, of Westminster; and (3) a scheme for public lighting only—being an improvement on the present system of lighting by oil-lamps.

In the scheme submitted by Messrs. Coates and Son, the current would be generated by suction-gas plant, with engines and dynamos in duplicate. The scheme includes 70 standards for public lighting, having two lamps on each standard, to be maintained at a cost to the ratepayers of a rate of 3d. in the pound. This light would be supplied all the year round between the hours of dusk and 1 a.m. The plant would be of sufficient capacity to supply current for 4000 lamps for the lighting of private houses and shops, &c.; and the cost of current for a 16 candle power metallic filament lamp would, they say, "be 0·12d. per hour, or, in other words, one unit of electricity, costing 6d., would supply five lamps for ten hours." The cost of the scheme would be £3000; and in the event of a Company being formed to undertake both the public and the private lighting of Greystones, Messrs. Coates are quite willing to undertake all the preliminary work in connection with the flotation of the Company, and to subscribe £1000 towards the capital, on the understanding that satisfactory agreements are entered into with the local authorities, granting full powers to execute all necessary work in connection with the public and private lighting for a term of at least fifteen years.

The scheme for lighting by coal gas, submitted by Messrs. Anderson Bros., "subject to the Greystones Gas Act, 1908, receiving consent of Parliament," provides for maintaining standard lamps for 168 nights in each year from sunset to 12.30 a.m., at a cost to the ratepayers of 32s. per lamp, with an extra charge of 3d. per lamp per night for any additional nights on which public lighting would be ordered by the Local Authority—that is to say, to maintain 68 lamps for 192 nights in each year would cost a sum equal to 3d. in the pound. In a previous scheme they submitted to the Rural District Council, the firm stated that they would be prepared to supply gas to private consumers at the rate of 5s. 6d. per 1000 cubic feet. This would be a Company; and the ratepayers would be under no responsibility in connection with the supply of any capital.

In conclusion, the Committee state that they are of opinion that the scheme submitted by Messrs. Coates and Son appears the most suitable, provided that the balance of capital required for the formation of the Company can be subscribed. Should the requisite amount of capital not be forthcoming, the Committee recommend an improved system of lighting by oil-lamps.

Subsequently a meeting of ratepayers was held, at which some curious opinions regarding the respective merits of gas and electricity were given expression to; and in the end, the electrical scheme was unanimously approved of, subject to the capital being subscribed by March 31. The following resolution was also carried: "That in the opinion of this meeting of ratepayers it is not desirable that Messrs. Anderson Bros. be granted the powers they are seeking for supplying gas for public lighting in the Bill now before Parliament. That the member of Parliament for East Wicklow be requested to oppose the Bill." As an indication of the lengths to which optimism has gone in Greystones, Mr. C. L. Matheson, K.C., is reported to have said at the meeting that "he was not a betting man. If he were, he would bet 500 to 1 that at the end of the first five years all people in Greystones would have the electric light in their houses." It is probably fortunate for Mr. Matheson that he is not a betting man.

ELECTRIC LIGHTING AT MONMOUTH.

Town Council's Proceedings Declared "Unsatisfactory."

In the latter part of last year (as was recorded in the "JOURNAL" for Oct. 8 and Nov. 12), Mr. H. R. Hooper, M.Inst.C.E., one of the Inspectors of the Local Government Board, held an inquiry at Monmouth into an application by the Town Council to borrow £10,000 for the purpose of defraying expenses already incurred in connection with the electric lighting undertaking. In the course of the inquiry, the methods of the Corporation were strongly criticized; and the Board have now communicated their decision to the Council in a letter which fully supports this attitude.

In the course of this statement of the Board's views, which was addressed to the Town Clerk by Mr. Noel Kershaw, Assistant-Secretary, the writer says: "The Inspector's report shows that the proceedings of the Town Council in connection with their combined scheme of sewerage and electric lighting have been unsatisfactory throughout. No proper accounts of the expenditure have been kept; and, in spite of the fact that the cost of the works was in many cases largely in excess of the amount of the contract, the Town Council made payments from time to time simply on the Engineers' certificates, which gave no details, and were apparently unaccompanied by any invoices or contractors' statements. The Town Council, in fact, appear to have exercised no control over the expenditure; and in the absence of proper accounts and statements, they can have no knowledge of what work was covered by the payments made by them on the Engineers' certificates. It further appears that the Town Council have allowed the electric lighting undertaking to get into a very bad state, with the result that there are numerous complaints as to the quality of the light, and the number of consumers has not increased during the last three years. The undertaking has, in fact, involved a heavy loss to the ratepayers, and there is likely to be still greater loss unless the distributing cables are thoroughly overhauled and put into good order at once. From the information obtained by the Inspector, it would seem that the present audit of the accounts of the Town Council is of a most superficial character; and, looking to the action of the Town Council in raising a loan by means of an overdraft without any legal authority, and their proceedings in connection with the electric lighting and sewerage scheme, the Board feel that they cannot properly sanction any further loans unless the accounts of the Town Council are in future made subject to audit by a District Auditor." The Board recommended that this should be affected by a Provisional Order; and subject to this being done, they are disposed to consider that loans of £1735 for sewerage works and £6681 for electric lighting works might be sanctioned in respect of the excess expenditure incurred in connection with the combined scheme. At the same time, however, it is pointed out that the available borrowing power of the Town Council under the Public Health Act, 1875, seems insufficient to allow of the loans of £1735 and £6681 being sanctioned at present; while a further loan will be required to provide additional pumping plant at the sewage works. The Board are disposed to think that this difficulty might be removed by the insertion, in the Provisional Order applying a system of audit by a District Auditor, of a provision that moneys borrowed by the Town Council for purposes of electric lighting shall not be reckoned, or be deemed to have been reckoned, in the calculation of the sums which the Council may borrow under, and for the purposes mentioned in, section 233 of the Public Health Act, 1875. But the Board would only be prepared to entertain an application for this purpose in connection with an application for a Provisional Order providing for a proper audit of the accounts by a District Auditor.

When the letter came before the Council, it was unanimously resolved to apply for a Provisional Order directing that the accounts should in future be made subject to audit by a District Auditor, and that the Council should undertake to provide additional pumping plant at the sewage works. It was also agreed that in the reply to be sent to the Board their views should be asked with regard to a suggestion to endeavour to dispose of the electricity works, and apply the proceeds in paying off a debt to the bank, which will amount to nearly £4000 after the amount of the loan which the Board now propose to sanction has been deducted from it.

Draycott Gas Company's Bill.—At a meeting held last Tuesday, the shareholders of the Draycott Gas Company unanimously approved the Bill which the Company are promoting in Parliament to extend their present powers and to repeal certain powers of the Long Eaton Gas Company. The Bill will, if passed, define the respective areas of the two Companies, and exclude the Long Eaton Company from the district hitherto served by the Draycott Company. Mr. J. N. Derbyshire, the Chairman, presided, and mentioned that the share capital of the Company was £19,200, and present in person or by proxy they had represented £15,500.

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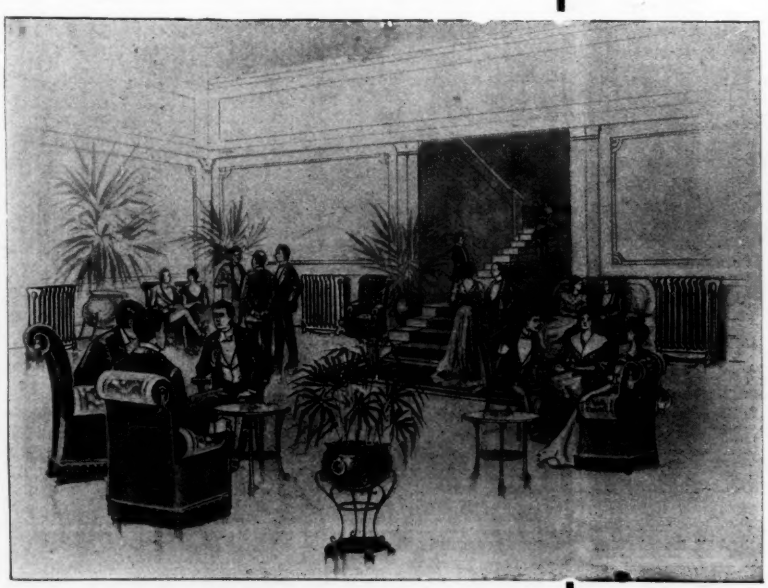

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WRIGHTS THE RADIATOR PIONEERS.

PROPOSED EXTENSION OF THE RHYL GAS AREA.

Last Wednesday, an inquiry was held into an application by the Rhyl District Council for a Provisional Order to enable them to extend their area of gas supply two miles from the Town Hall into a portion of the ancient borough of Rhuddlan. It was due to a request from Epworth College to supply them with gas for educational purposes. The inhabitants of Rhuddlan were represented by Mr. A. Jones, who said they opposed conditionally, and wanted a clause inserted in the Order to the effect that if the Rhyl Council had the power to supply gas to any portion of Rhuddlan, they should give an undertaking that for a period of thirty years they would not seek powers to annex any part of the parish; and that should a public authority or private or public company erect gas-works in Rhuddlan, the Council would hand over their service in the parish at a valuation. On behalf of the Council, the Clerk (Mr. A. Rowlands) opposed these conditions on principle, contending that it was not right to tie the hands of an authority, and that the request was unreasonable, seeing that the application for gas outside the Rhyl area came from a resident in Rhuddlan who was the proprietor of a boys' college with 80 students. The inhabitants of the ancient borough where Edward I. held his first Welsh Parliament were content to light their streets with oil-lamps. Rhyl did not want to "gobble up" Rhuddlan, but desired to supply it with gas at a cheap rate. The Council could not charge more than 4s. per 1000 cubic feet for gas; and they were actually selling at 3s. 6d. Mr. W. Conway Bell said the Rhuddlan people wished to be left in peace, to manage their own affairs. They believed this application was only the thin edge of the wedge towards the annexation of a large portion of the borough; and already steps were being taken to secure a gas supply. In reply to the Inspector, Mr. Bell admitted that the question of a gas supply was very much in the air. They had talked it over, but had not had engineering advice or worked out figures. The Inspector said it was admitted that gas was wanted, but there was nothing practical as to getting it except from the Rhyl Council, who could supply it much cheaper than a tiny place like Rhuddlan could make it for.

WATER CHARGES IN LIVERPOOL.

At the Meeting of the Liverpool City Council last Wednesday, Alderman Burgess, the Chairman of the Water Committee, in moving the adoption of the report and estimates of receipts and payments on the revenue account for 1908, and the levying of the rates and rents mentioned, said that they had a surplus to begin with this year of £12,220, which they carried forward to next year's account. This was to some extent owing to the fact that they were able to transfer £3395—capital expenditure undertaken on behalf of Wallasey—which they paid out of revenue pending the decision as to whether or not Wallasey would agree to pay this amount for superintendence of the works. They had further a considerably larger amount from rents, &c. He was glad to think that at the end of the twelve months they were able to expect that for the current year they would not have to make any additional charge in the water-rent, which remained at 7½d. in the pound—exactly the same as last year. Colonel Parter having seconded the motion, Mr. Gates proposed, as an amendment, that the water charges be fixed by scale, or other equitable methods, and that all special agreements now in force be at once terminated. He pointed out that there were special agreements with the Lancashire and Yorkshire Railway Company and the London and North-Western Railway Company, and £2800 was lost in revenue under the preference which was given to them. Unless something was done without delay, the rate would have to be increased before long. Alderman Burgess replied that there was an agreement by which the Committee supplied water at 4d. per 1000 gallons where the consumer, in case he also received a supply from a well or a canal, would give up these other sources. What had been done in this direction, however, had not been altogether encouraging to the Committee. The total number of consumers of this sort was so exceedingly small that it made no difference to the finances of the Committee. Before anything was done for any other portion of the community, they ought to get the domestic water-rent down to 6d. in the pound. The next thing to be done was to reduce the charge for shipping. It was not now a high charge; but there was room for reduction. When they had done this, he did not hesitate to say that before they went further in lowering the domestic charges they ought to reduce those for trade purposes. They wanted to encourage new industries, and induce people beginning in a small way to extend their businesses. The Committee hoped the time would come when the Council would be able to bring down the charges for trade purposes; but those now in force were quite equitable, and had been very carefully discussed. The amendment was defeated by 52 votes to 46, as was another to the effect that consumers supplied by meter should have their water charges reduced from 6d. to 5d., and as to the rural townships from 9d. to 7½d. per 1000 gallons. The report and estimates of the Committee were then adopted.

The Security of Prepayment Meters.—During the hearing of a case at Birmingham, in which a man was charged with stealing money from a slot-meter situated in a cellar, to which he obtained access by raising the grating and lowering himself down, Mr. Barradale (the Magistrates' Clerk) said that, in his opinion, the Gas Department should collect the money from the meters more often. Mr. Short (the Presiding Magistrate) thought the attention of the Gas Department should be called to the epidemic of robberies, and that they should be asked if they could not put the meters in safer positions. At the same time, householders should co-operate with the authorities by securing their cellar gratings. The prisoner (William Jones) was committed for trial to the Quarter Sessions.

CANNON IRON FOUNDRIES, LIMITED.

NOTICE OF REMOVAL

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18, HOLBORN VIADUCT, E.C.

TO ENGINEERS AND OTHERS—Please note the Three Windows of our New Show-Rooms at 18, Holborn Viaduct as above, and **give us a call there.**

CANNON IRON FOUNDRIES, LIMITED,

18, HOLBORN VIADUCT, E.C. Works: DEEPFIELDS, STAFFS.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

Somewhat sooner than was expected when I wrote three weeks ago, Lord Johnston has been able this week to hear Counsel in the action brought by Messrs. James Muir and Son, Limited, against the Edinburgh and Leith Gas Commissioners, with reference to the pollution of the pursuers' Brewery Well. The plea under discussion was that of the defenders, to the effect that, in view of the remedial operations which they have executed, and are in course of executing, the action should be sisted, to await the result of the operations. The position taken up by the pursuers was that the case should be sent to proof. They contend that pollution has not sensibly diminished, and that they are entitled to be allowed to prove that this is so, and then the amount of damage they have sustained and will sustain. Lord Johnston stated plainly that he could not keep back the case to suit the convenience of the defenders; but, on the other hand, he could not disregard their request that the well should be cleaned out and afterwards tested. The Gas Commissioners offered to do this work; but his Lordship considered that he could not allow anyone but the owners to do this. But the work is to be done in the sight of a neutral engineer and chemist whom he is to appoint; and the defenders are to be allowed to look on and make suggestions to the judicial inspector, who, again, is to apply to the Court for direction should he at any time find himself in a difficulty. There are possibilities here which may consume a good deal of time; but this has been allowed for, as Lord Johnston indicated that he will not be in a position to take the proof which must follow the inspection before the first week in June—four months hence.

In the Glasgow Town Council on Thursday, Mr. Willocks asked a question with reference to the practice of cutting off gas for non-payment of gas-rates. Bailie Montgomery, the Convener of the Gas Committee, replied that the cases in which this had been done had not been more numerous than in any previous year. He was quite willing to bring before the Gas Committee and the officials the desirability of exercising forbearance in the collection of gas-rates before cutting off the supply, where they were satisfied that non-payment was due to exceptional distress.

That corporations do not always ride when they saddle, is brought home to us by the action of the Town Council of Edinburgh upon the subject of testing the illuminating power of the artificial light supplied in the city. A fortnight ago, I wrote that a Sub-Committee had agreed to recommend that apparatus for testing both gas and electric light should be fitted up in the City Chambers. But the recommendation was not adopted in full; for when the subject came before the Council on Tuesday, the Lord Provost's Committee, having considered what the Sub-Committee had done, recommended that apparatus to test the gas be fitted up, at a cost of £100. Judge Brown asked why the Committee had decided not to have a test of the electric light, as had been resolved upon. Lord Provost Gibson replied that as they had inspectors to inspect the electric light, the Committee considered that there was no necessity to incur the extra expenditure of £10 which this would entail. Judge Brown considered that, for the satisfaction of users of electric light, it was desirable that both illuminants should be tested. Mr. A. A. Murray, the Convener of the Electric Lighting Committee, said Mr. Brown was under a misapprehension in regard to the testing, because in various places in the city—about twenty—they had testing-stations. These, however, were not for testing the light but the voltage; and therefore money spent to find this out would be useless and senseless expenditure. After some further discussion, the recommendation as to the testing of the gas was agreed to, which means that the gas supply is to be vigorously watched; but the Electric Lighting Committee are to be allowed to go on giving light or no light, as they please.

Another try is being made in the matter of the proposed gas transfer at Selkirk. It is reported that the Gas Company, whose previous offer to accept £15,000 was rejected by the Town Council, have intimated that they are prepared to sell for £14,326, and that the Town Council Committee who are in charge of the matter are agreeable to the transfer at this sum. The Council held a meeting in private upon the subject this week, but failed to come to a unanimous finding; and consideration of the offer was deferred to another meeting.

The shareholders of the Lochgelly Gas Company, Limited, at an extraordinary general meeting held yesterday, unanimously resolved that the capital of the Company be increased to £17,000, by the issue of 7000 new shares of £1 each; and that debentures be issued to the amount of £4000, bearing interest at the rate of 4 per cent. per annum, and repayable in three years. Of the new shares, 5000 are to be offered to the present shareholders, at par, and the remaining 2000 to the public, at a premium of 2s. 6d. per share.

It is reported that an application by Mr. Watson, solicitor, of Leven, Fifeshire, on behalf of clients, for permission to lay gas-pipes through the streets of Largo was considered by the Parish Council there on Wednesday evening. The Council refused the application until they are furnished with full information as to the nature of the undertaking, and the responsibility attached thereto. This intimation foreshadows the erection of new gas-works. Another reason which probably weighed with the Parish Council when they resolved not to grant the application was that someone stated that Mr. F. T. Wallace, solicitor, of Leven, had obtained permission from the County Council to lay gas-pipes from Leven to Lundin Links, which is midway between Leven and Largo, and the Parish Council thought it prudent to wait till they should be able to ascertain at what price the rival companies would be prepared to sell gas in Largo.

In the execution of their remit, prior to resolving as to the transfer of the local gas undertaking, the Special Committee of the Fraserburgh Town Council have appointed Mr. W. B. M'Lusky, Gas Engineer and Manager, of Perth, to report upon the construction and present condition of the Fraserburgh Gas Company's works, the Company's position,

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and the probable cost of acquiring the whole undertaking; and Mr. Richardson, Electrical Engineer, of Dundee, to make an inspection and report with reference to the introduction of a system of electric lighting in the burgh.

The announcement is made that, in connection with the negotiations which are proceeding between the Gas Committee of the Glasgow Corporation and the Busby Gas Company, with regard to the proposed transfer of the pipes of the Company to the Corporation, a memorandum, giving particulars of the operations of the Company, has been prepared for circulation among the parties interested. In this document, it is stated that when the Company, in 1888, took over the works, which had been established fifty years prior to that date, and proposed to lay mains to Giffnock, they consulted with the Corporation, who offered no objection. In that year, the Lighting Committee for Clarkston and Busby had a dispute with the Gas Company, and a deputation of the Committee waited upon the late Mr. W. Foulis, the Gas Engineer to the Corporation, with a request that the Corporation should extend their mains and supply their district. Mr. Foulis advised them that it was not practicable from a business point of view; and he declined to entertain the proposal. Since 1888 the Company have supplied gas of a high illuminating power, have reduced the price from 6s. 8d. to 4s. 7d., and intended making a further reduction to 4s. 2d. next term—the increased consumption having enabled them to do so. The competition in Giffnock, by Glasgow, however, having compelled the Company to reduce their price in the Giffnock district to 2s. 4d., which will be unprofitable, it will be impossible to make any reduction to the other portions of the Company's district; so that these will, in consequence, be prejudiced. With a view to meeting the increasing requirements of the districts supplied, it is also stated, the Company have equipped their works so that, with little or no additional expenditure of capital, the present supply of gas could be more than doubled.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Feb.* 8.

Sulphate of Ammonia.

There has been no special feature in the market upon which to comment, but demand has been steady, and everything offered has readily been disposed of at last week's prices. The closing quotations are £11 17s. 6d. per ton f.o.b. Hull, £11 18s. 9d. to £12 per ton f.o.b. Liverpool, and £12 2s. 6d. per ton f.o.b. Leith. There has also been inquiry for delivery over the spring months; but buyers are not very keen unless at prompt prices, which makers are not willing to accept. Consequently, any important business done has been taken speculatively.

Nitrate of Soda.

This article is firm, and spot prices are 11s. 3d. and 11s. 4½d. per cwt. for 95 per cent. and refined qualities respectively.

LONDON, *Feb.* 10.

Tar Products.

Pitch is very quiet, especially for prompt; there still being some anxious sellers for delivery this side of June. Over this period, business is being done at 20s. on the east coast; while London make could be secured at 20s. 6d. to 21s. On the west coast, there have been sellers at 19s. 6d., Liverpool. Creosote is quiet, and is not much in demand at present; one or two makers having some quantity to dispose of for prompt delivery. In London, it is possible to buy at 2⅝d. for prompt; while in the Midlands, 2⅝d. would be taken. In the Lancashire district, oil is reported to have been sold at low figures, equal to 2½d. Manchester, and 2⅝d. Liverpool, having been accepted for immediate delivery. Large shipments have still to be made. Benzol 90 per cent. is steady at 8d. in the North, and 8¾d. in London. Benzol, 50-90 per cent., and toluol are still neglected, and pure has been sold at very low figures on the Continent. As to solvent, both ordinary and heavy are depressed, especially in the North, where under 9d. is said to have been accepted for 90-160. Carbolic acid is steady. Business has been done at 1s. 7d. on the east coast. Crystals are still quiet, and difficult of sale. Naphthalene remains very firm for both crude and refined.

The average values during the week were: Tar, 12s. 6d. to 16s. 6d., *ex* works. Pitch, London, 20s. 6d. to 20s. 9d.; east coast, 19s. 9d. to 20s.; west coast, 18s. 6d. to 19s. 6d. f.a.s. Benzol, 90 per cent., casks included, North 8d. to 8¼d., London 8¾d.; 50-90 per cent., casks included, North and London 8d. to 8⅛d. Toluol, casks included, North and London 9¼d. to 9⅜d. Crude naphtha, in bulk, North 3⅜d. to 3¾d., London 3¾d. to 4d.; solvent naphtha, casks included, North 8¾d. to 9¼d., London 10¼d. to 10½d.; heavy naphtha, casks included, North 10d. to 10½d., London 10½d. to 11½d. Creosote, in bulk, London 2⅝d. to 2¾d., North 2⅝d. to 2⅝d. Heavy oils, in bulk, 2¾d. to 3d. Carbolic acid, 60 per cent., casks included, east coast 1s. 6⅜d. to 1s. 7¼d., west coast 1s. 6¼d. to 1s. 6⅜d. Naphthalene, £6 10s. to £10 10s.; salts, 45s. to 47s. 6d., packages included and f.o.b. Anthracene, "A" quality, 1¼d. to 1¾d. per unit, packages included and delivered.

Sulphate of Ammonia.

This article is steady, but not much business has been done. Great satisfaction has been felt at the large increase of January shipments over those of last year. The London Gas Companies are unchanged as to price; while outside makes are fetching £11 17s. 6d. to £11 18s. 9d. upon Beckton terms. Hull has been sold at £12 for prompt delivery, but only for the best makes. Liverpool is reported £12 to £12 1s. 3d.; while in Leith £12 2s. 6d. is the value, though makers are in most instances too well sold at the latter port to be interested very much in the figures ruling for prompt delivery.

At a meeting of the Gas Strip Association at Birmingham last Thursday, it was decided to reduce the price by 5s., making it £7 to £7 2s. 6d. This follows a reduction made prior to the quarterly meeting in January.

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COAL TRADE REPORTS.

Lancashire Coal Trade.

There are no signs of any easing in prices of coal in the Lancashire colliery districts. The general demand keeps up well. The Great Central Railway Company's coal bill for the year just closed was £50,000 more than in the previous year. Little disputes between colliers and their employers here and there, coupled with the strike of over 3000 hands at one of the Nottinghamshire coal pits, which has extended over six weeks, have tended to strengthen Lancashire's position by narrowing the sources of supply. The exports of coal during January rose by no less a sum than £837,000.

Northern Coal Trade.

There is ease in some of the branches of the northern coal trade; and though there are fair shipments, the range of prices is in some cases lower. In the steam coal trade, best Northumbrians are from 12s. to 12s. 3d. per ton f.o.b., second-class steams about 11s. 3d., and steam smalls from 6s. to 6s. 6d. Work at the collieries is fair for this season of the year; and the output seems to be well taken up. In the gas coal trade, there is a heavy but lessening demand, and the shipments are full. Prices of Durham gas coal range from about 11s. 6d. to 13s. per ton f.o.b., according to quality, and for early shipment—with some variation when the delivery is forward. Several contracts are now in the market, including those for Stockholm and Gothenburg. The Stockholm contract is the most important; but it is usually allotted to two or three Durham collieries, which have long held it, and are expected to again take the bulk of it. The Riga Gas-Works are also in the market for some 15,000 tons of Durham gas coal; and small contracts have been settled for 4000 tons of best at a price that is said to allow 13s. per ton f.o.b. Heavy contracts are also spoken of for other Swedish towns. Coke is generally steady; but gas coke is plentiful, and is easier in price—possibly from 17s. to 18s. f.o.b. being near the current quotations, but with some fluctuation.

Scotch Coal Trade.

The back-set in trade is getting more pronounced. As foreign contracts are expiring, it is found that they are not being renewed at the old prices; and it is being realized that the boom which followed the abolition of the coal-tax is worked out. Home consumers are benefiting by the plentiful supplies which are in the market; while coalowners are finding it necessary to be easier in their prices. The quotations are: Ell 12s. to 13s. 6d. per ton f.o.b. Glasgow, splint 13s. to 13s. 7d., and steam 12s. 3d. to 12s. 6d. The shipments for the week amounted to 201,245 tons—a decrease of 50,859 tons upon the previous week, and of 57,982 tons upon the corresponding week of last year. For the year to date, the total shipments have been 930,693 tons—a decrease of 123,216 tons upon the corresponding period of 1907.

Prophecy at West Ham.

Towards the end of November, the Committee of the Forest Gate Ratepayers' Association and a few friends paid a visit to the electric light works of the West Ham Corporation at Canning Town; and during the visit Alderman Littler (who had just been elected for the third year Chairman of the Electric Light and Tramways Committee) was moved to prophecy. He said twelve months ago they reduced the price of the current. Many, especially technical men, up and down the country told them they were making a big mistake, and that they could not, in a district like West Ham, produce the current at that price. In March last, they had a deficit of about £1800 on the year's working. He was going to prophesy—and this prophecy was founded on knowledge—there was going to be nothing like that position in March next; and if they did not get £3000 profit, he hoped they would "kick him out of the chair." Their revenue was, roughly, up by £7169; but there was an increased expenditure for the staff and for coal and upkeep. He was satisfied that the Companies who were promoting Bills in Parliament would readily pay them £450,000 for the undertaking. Last year, on the capital expended, they showed a profit of 6¼ per cent. Another prophecy was indulged in by the General Manager (Mr. A. H. Seabrook), who, when speaking at the annual staff dinner a few days ago, said he believed that "after this year there would be no necessity for a deficit balance to be shown in their balance-sheet." This is encouraging for an undertaking in which, as Alderman Littler admits, there has been risked £381,000 of the ratepayers' money. Should the promised profit of £3000 on this year's working fail to materialize, it is to be hoped that Alderman Littler will not be taken at his word, and "kicked out of the chair."

Unprofitable Electricity at Loughborough.—The half-yearly report of the Loughborough electricity undertaking shows an expenditure of £1215, including £827 for the generation of electricity, £89 for distribution, £57 for public lamps, £22 for rates, insurance, &c., £187 for management expenses, and £33 loss on exhibition. The receipts were: Sale of current, £774; rent of meters and public lighting, £82; sale and repairs of lamps, &c., £28; total, £885—leaving a deficiency to be carried to the net revenue account of £330.

An Excellent Report at Grantham.—In the report presented at the meeting of the Grantham Gas Company last Tuesday, the Directors congratulated the stockholders on an exceptionally good half year. The consumption of gas was the largest ever recorded; and notwithstanding the increased price of coal, the net profit had been very satisfactory. They recommended that, out of the balance of £4026 standing to the credit of the profit and loss account, £1000 be placed to the reserve fund, making it £4000, and that the sum of £2000 be applied in the payment of the maximum dividend of 5 per cent. per annum on the consolidated stock; leaving £1026 to be carried forward to the next account. The Chairman (Mr. J. G. Thompson), in moving the adoption of the report, said it was perhaps the best that had been presented since the Company was formed. They had had to contend with some difficulties, as coal had increased in price.

THREE POINTS

of advantage from the many found in our Slot Meters are:

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AGENTS FOR SCOTLAND:

D. M. NELSON & CO., 53, WATERLOO STREET, GLASGOW.

Sales of Shares and Stock.—In accordance with the announcement which recently appeared in our advertisement columns, Mr. Alfred Richards offered for sale at the Mart, Tokenhouse Yard, E.C., last Tuesday, new issues of capital of the Aldershot Gas and Water Company and the City of Chichester Gas Company. "G" ordinary £10 shares (7 per cent.) of the first-named Company fetched from £14 to £14 7s. 6d. each, and "G" preference £10 shares (5 per cent.), £11 10s. apiece. The new issue for the Directors of the Chichester Gas Company consisted of £5000 of "C" 7 per cent. stock; and it was sold at £126 to £130 10s. per £100. On the same occasion, £800 of "A" ordinary consolidated stock of the Brighton and Hove General Gas Company, carrying 8½ per cent. dividend, was offered for sale by order of the Trustees; and it realized from £156 to £157 per £100. The sale-room was crowded; and there was excellent competition for all the stock and shares to be disposed of. At the Sun Hotel, Kingston, last Thursday, Messrs. Nightingale, Phillips, and Page sold, under instructions from executors, £1600 of debentures of the Kingston-upon-Thames Gas Company at a uniform price of £102 10s.

The result of a poll of the ratepayers of Merthyr Tydfil on the subject of the promotion by the Corporation of a Bill to enable them to construct water-works and make better provision for the improvement and good government of the borough has been the rejection of the proposal by 4250 votes.

The Vivid Syndicate, Limited, has been formed with a capital of £13,000, in £1 shares (1000 being 6 per cent. preference), to adopt an agreement with Messrs. S. Beven and C. J. Alexander, and to carry on the business of manufacturers of, and dealers in, incandescent gas mantles, burners, &c. There will be no initial public issue.

Messrs. Smith and Bridges, whose names will be remembered by most readers in connection with the successful Gas Exhibition at Earl's Court in 1904, are organizing a Municipal, Building, and Public Health Exhibition, to be held in the Agricultural Hall, Islington, from the 1st to the 12th of May. The exhibits will include appliances for street lighting, water supply, furnishing electric power for industrial purposes, and dust abatement on roads.

"ILLUMINATING TRUTHS."

LEAFLETS FOR DISTRIBUTION.

No. 1.—"The Sanitary Aspects of Gas and Electric Lighting."
No. 2.—"The Cleanliness of Illuminants: The Eyesight."
No. 3.—"Fire Risks."
No. 4.—"The Relative Cost of Gas and Electricity, and Matters affecting it."
No. 5.—"On Reliability, with Instances of Misplaced Confidence."
No. 6.—"On Shop Lighting, with Special Reference to the Flame Arc Lamp."
No. 7.—"The Osram Lamp: Fiction and Fact."

This series of Leaflets will be useful, not only for distribution among Householders generally, but for circulation among Shareholders to fortify them with arguments in defence of the commodity in which they have invested capital. Copies of each Leaflet should also be kept in every Gas Undertaking's Show-Rooms.

Prices for Quantities on Application to WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

WORKS MANAGER (TAR-WORKS). No. 4932.
REPRESENTATIVE (GAS STOVE). No. 4906.
REPRESENTATIVE (COMPO. PIPE, &c.). No. 4905.
MECHANIC AND BLACKSMITH. Waterford Gas Company.
STOKERS. No. 4907.

Situation Wanted.

REPRESENTATIVE. No. 4869.

Pupil Required. Firth Blakeley, Sons, and Co., Dewsbury.

Plant, &c., for Sale.

ENGINE, EXHAUSTER, &c. Barrhead Gas-Works.
STOKING MACHINES. Keighley Gas Department.

Plant, &c., Wanted.

TANK WAGGONS (HIRE OR PURCHASE). Cardiff Alkali Company.

Company Meetings.

BARNET DISTRICT GAS AND WATER COMPANY. Holborn Restaurant. Feb. 28, 12.30 o'clock.
BRENTFORD GAS COMPANY. St. Ermin's Hotel. Feb. 14, 2.30 o'clock.
BRIGHTON AND HOVE GAS COMPANY. London Office. Feb. 28, Two o'clock.
HARROW AND STANMORE GAS COMPANY. Holborn Restaurant. March 2, Twelve o'clock.
MITCHAM AND WIMBLEDON GAS COMPANY. Offices. Feb. 25, Three o'clock.
RIDDINGS DISTRICT GAS COMPANY. London Office. Feb. 28, 3.30 o'clock.
SOUTH SUBURBAN GAS COMPANY. De Keyser's Hotel. Feb. 21, Three o'clock.

Stocks and Shares.

LOWESTOFT WATER AND GAS COMPANY. Feb. 25.
MITCHAM AND WIMBLEDON GAS COMPANY. Feb. 13.
SOUTHEND WATER COMPANY. March 3.
SOUTH ESSEX WATER COMPANY. Feb. 25.
SUNDERLAND AND SOUTH SHIELDS WATER COMPANY. Feb. 20.

TENDERS FOR

Condenser.

MATLOCK and DISTRICT GAS COMPANY. Tenders by Feb. 20.

Fire-Clay Goods.

LIMERICK GAS DEPARTMENT. Tenders by Feb. 17.

General Stores and Supplies.

STOCKTON-ON-TEES CORPORATION. Tenders by Feb. 17.

Pipes, &c.

LEEK GAS DEPARTMENT. Tenders by Feb. 14.

Steel Framework and Roofs.

SOUTHEND-ON-SEA GAS COMPANY. Tenders by Feb. 20.

Sulphuric Acid.

MORECAMBE CORPORATION. Tenders by Feb. 28.

Tar.

LINCOLN GAS DEPARTMENT. Tenders by Feb. 17.
MANCHESTER GAS DEPARTMENT. Tenders by March 26.
MORECAMBE CORPORATION. Tenders by Feb. 28.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 341.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
500,000	10	Oct 11	10½	Alliance & Dublin 10 p.c.	19½—20⅛	..	5 2 5
268,324	"0	,,	7½	Do. 7 p.c.	14—15	..	5 0 0
310,000	Stk.	Jan. 16	4	Do. 4 p.c. Deb.	98—100	+1	4 0 0
200,000	5	Oct. 30	7	Bombay, Ltd.	6⅛—6⅜	..	5 3 8
40,000	5	,,	7	Do. New, £4 paid	4½—5	..	5 12 0
50,000	10	Aug. 29	14	Bourne-mouth Gas and Water	10 p.c.	..	4 18 3
					B 7 p.c.		
					Pref. 6 p.c.		
51,810	10	,	7		16¼—17	..	4 2 4
53,200	10	,	6		14½—15⅜	..	3 17 5
380,000	Stk.	Aug. 15	12½	Brentford Consolidated	247—252	..	4 19 2
300,000	,,	,,	9⅜	Do. New	185—190	..	5 0 0
50,000	,,	,,	5	Do. 5 p.c. Pref.	120—125	..	4 0 0
206,250	,,	Dec. 13	4	Do. 4 p.c. Deb.	100—105	..	3 16 2
220,000	Stk.	Sept. 27	11¼	Brighton & Hove Orig.	200—210	..	5 7 1
246,320	,,	,,	8½	Do. A. Ord. Stk.	153—158	..	5 4 5
460,000	20	,,	10	British	42½ 43½	+½	4 11 11
104,000	Stk.	Aug. 15	6	Bromley, Ord. 5 p.c.	118—121	..	4 19 2
165,700	,,	,,	4½	Do. do. 3½ p.c.	88—91	..	4 18 11
500,000	10	Oct. 11	7	Buenos Ayres (New) Ltd.	11½—11⅝	..	5 19 2
250,000	Stk.	Dec. 13	4	Do. 4 p.c. Deb.	91—93	..	4 6 0
150,000	20	July 12	8½	Cagliari, Ltd.	26—27	..	6 2 3
100,000	10	—	—	Cape Town & Dis., Ltd.	6—8	..	—
100,000	10	Apl. 26	4½	Do. 4½ p.c Pref.	7—9	..	5 0 0
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	48—50	..	6 0 0
100,000	Stk.	Dec. 30	4½	Do. 4½ p.c. Deb. Stk.	92—94	..	4 15 9
157,150	Stk.	Aug. 15	5	Chester 5 p.c. Ord.	108—110	..	4 10 11
1,493,280	Stk.	,, 29	5⅛	Commercial 4 p.c Stk.	104—109	..	4 15 5
560,000	,,	,,	5	Do. 3½ p.c. do.	101—106	..	4 14 4
475,000	,,	Dec. 13	3	Do. 3 p.c. Deb. Stk.	82—84	..	3 11 5
800,000	Stk.	,,	6⅜	Continental Union, Ltd.	110—115	+3	5 13 1
200,000	,,	,,	7	Do. 7 p.c. Pref.	137—142	+2	4 18 7
460,170	Stk.	—	5⅛	Derby Con. Stk.	122—123	..	4 9 5
55,000	,,	—	4	Do. Deb. Stk.	103—105	..	3 16 2
148,995	,,	—	—	East Hull 5 p.c. Ord.	101—104	..	—
486,090	10	Jan. 30	12	European, Ltd.	22½—23⅜*	+⅛	5 2 2
354,060	10	,,	12	Do. £7 10s. paid	16⅜—17⅛*	+⅛	5 2 10
15,182,590	Stk.	Aug. 15	4⅛	Gas-light and Coke	4 p.c. Ord.	..	99—101	..	4 7 2
					3½ p.c. max.		88—90	+1	3 17 9
					4 p.c. Con. Pref.		104—107	..	3 14 9
					3 p.c. Con. Deb.		82—84	..	3 11 5
2,600,000	,,	,,	3⅛	Hastings & St. L. 3½ p.c.	93—98	..	5 2 0
3,799,735	,,	,,	4	Do do. 5 p.c.	114—117	..	5 11 1
4,193,975	,,	Dec. 13	3	Hongkong & China, Ltd.	19—20	..	5 10 0
258,740	Stk.	Sept. 13	5	Imperial Continental	181—184	..	4 7 0
82,500	,,	,,	6½	Do. 3½ p.c. Deb. Red.	93—95	..	3 13 8
70,000	10	Oct. 11	11	Lea Bridge Ord. 5 p.c.	115—120	..	5 0 0
4,940,000	Stk.	Nov. 14	8	Liverpool United A	223—225	..	4 8 11
473,600	Stk.	Aug. 15	3⅜	Do. B	164—166	+2	4 4 4
195,242	Stk.	Aug. 29	6	Do. Deb. Stk.	106—108	..	3 14 1
551,000	Stk.	Aug. 29	10	Maidstone 5 p.c.	140—145	..	5 5 2
718,100	,,	,,	7	Malta & Medn., Ltd.	4—4⅜	..	5 11 1
306,083	,,	Dec. 30	4	Met. of 5 p.c. Deb.	101—103	..	4 17 1
152,736	Stk.	Feb. 14	7⅜	Melbourne 4½ p.c. Deb.	101—103	..	4 7 5
75,000	5	Nov. 28	5	Monte Video, Ltd.	10⅜—11⅛	..	6 1 9
560,000	100	Oct. 1	5	Newc'tle & G'tesh'd Con.	107—108	..	4 5 8
250,000	100	,,	4½	Do. 3½ p.c. Deb.	86—88	..	3 19 7
1,000,000	10	Oct. 11	8	North Middlesex 10 p.c.	19½—20⅛	..	4 17 7
312,650	Stk.	Dec. 30	4	Do. 7 p.c.	13—14	..	5 0 0
250,000	10	Sept. 27	8	Oriental, Ltd.	137—140	..	5 14 4
125,000	50	Jan. 2	5	Ottoman, Ltd.	6—6⅜	..	5 7 8
135,000	Stk.	Sept. 13	10	Primitiva Ord.	6⅞—7⅛	..	4 16 7
209,984	,,	,,	10	Do. 5 p.c. Pref.	48—52*	..	4 17 7
523,500	,,	,,	10	Do. 4 p.c. Deb.	93—95	..	4 4 3
70,000	10	Nov. 14	10	River Plate Ord.	13½—14	..	5 14 4
6,429,895	Stk.	Aug. 15	5⅛†	Do. 4 p.c. Deb.	93—95	..	4 4 3
1,895,445	,,	Jan. 16	3	San Paulo, Ltd.	13—13⅜	..	5 18 6
201,720	Stk	Sept. 13	8	Do. 5 p.c. Deb.	49—51	..	4 18 0
605,000	Stk.	Aug. 15	5⅜	Sheffield A	244—246	..	4 1 4
60,000	,,	,,	5	Do. B	244—246	..	4 1 4
117,058	,,	Jan. 16	5	Do. C	244—246	..	4 1 4
502,310	Stk.	Nov. 14	5	South African	14½—15⅛	..	6 9 0
120,000	Stk.	Aug. 15	6⅜	South Met., 4 p.c. Ord.	125—127	..	4 3 11
398,940	,,	,,	5⅛	Do. 3 p.c. Deb.	83—85	+1	3 10 7
149,470	,,	Dec. 13	4	South Shields Con. Stk.	154—156	..	5 2 7
182,380	10	Dec. 30	8	S'th Suburb'n Ord. 5 p.c.	118—121	..	4 10 11
149,900	10	Jan. 2	5	Do. 5 p.c. Pref.	120—123	..	4 1 4
193,742	Stk.	Aug. 29	5	Do. 5 p.c. Deb. Stk.	120—125	..	4 0 0
30,000	Stk.	Feb. 14	8	Southampton Ord.	104—109	..	4 11 9
255,636	,,	Aug. 15	6⅜	Tottenham and Edmonton	A 5 p.c.	..	121—124	+1	5 8 10
75,000	,,	,,	5⅜		B 3½ p.c.	..	102—105	+2	5 0 0
80,075	,,	Dec. 30	3		4 p.c. Deb.	..	98—101	+1	3 19 3
845,872	,,	Aug. 15	5⅛	Tuscan, Ltd.		..	10¼—10⅜	..	7 8 10
185,000	,,	,,	5	Do. 5 p.c. Deb. Red.		..	98—100	..	5 0 0
228,300	,,	Dec. 30	4	Tynemouth 5 p.c. max.		..	107—109	..	4 11 9
				Wandsworth and Putney	A 5 p.c.	..	—	..	—
					B 3½ p.c.	..	128—133	..	4 17 9
					C 3½ p.c.	..	—	..	—
					3 p.c. Deb. Stk.	..	73—78	..	3 16 11
				West Ham 5 p.c. Ord.		..	103—106	+2	4 16 6
				Do. 5 p.c. Pref.		..	118—120	..	4 3 4
				Do. 4 p.c. Deb. Stk.		..	102—107	..	3 14 9

Prices marked * are "Ex div." † Next dividend will be at this rate.